

Effectiveness of Dias Repositioning Maneuver Versus Semont Maneuver in Patients With Benign Paroxysmal Positional Vertigo (Pc-bppv): A Comparative Study

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Abstract

Background

Benign Paroxysmal Positional Vertigo (BPPV) is a mechanical disorder that affects the peripheral vestibular system, resulting from otoconia displacement into the semicircular canals. BPPV causes transient episodes of vertigo triggered by abrupt changes in head position. Although the Semont Manoeuvre is an effective and commonly used repositioning technique for treating Posterior Canal-BPPV (PC-BPPV), the efficacy of the Dias Repositioning Manoeuvre, which is a more recent method of treating PC-BPPV, is uncertain. Therefore, the purpose of this study is to compare the efficacy of the Dias Repositioning Manoeuvre with the Semont Manoeuvre in PC-BPPV patients.

Methodology:

A total of 30 patients diagnosed with BPPV were allocated into two equal groups. Both groups received a single treatment session: Group A with the Dias Repositioning Manoeuvre and Group B with the Semont Manoeuvre. Vertigo Symptom Scale -Short Form (VSS-SF) & Dizziness handicap Inventory (DHI) were recorded pre-intervention, 1-hour post-intervention and after 1 week of intervention. Pre, post & follow-up scores of both outcome measures were compared, and the results were tabulated.

Results

Both groups showed substantial improvements in VSS-SF and DHI scores at baseline, post-intervention, and 1-week follow-up ($p < 0.05$). At follow-up, the Dias Repositioning Manoeuvre group saw a higher reduction in vertigo symptoms and disability ratings than the Semont Manoeuvre group, with statistically significant intergroup differences.

Conclusions

Results from the study highlighted that the Dias and Semont Manoeuvres are both useful for treating PC-BPPV. The Dias Repositioning Manoeuvre yielded relatively superior results, suggesting that it may be regarded as an effective choice in clinical practice.

INTRODUCTION

Benign Paroxysmal Positional Vertigo (BPPV) is the most prevalent vestibular disorder, characterised by brief, recurring episodes of vertigo precipitated by changes in head position [1, 2]. Canalithiasis is the most commonly accepted explanation for BPPV, in which displaced otoconia from the utricle migrate into the semicircular canals— specifically the posterior canal—resulting in abnormal endolymph flow and improper stimulation of vestibular receptors [3, 4, 5]. The condition has a significant impact on quality of

life, resulting in functional impairments, increased risk of falls, and fear of normal physical activity due to vertigo, positional nystagmus and functional imbalance. [1, 6]

The lifetime prevalence of BPPV globally has been estimated to be 2.4%, annual prevalence around 1.6%, and 4-week prevalence at 0.7%. [4] The posterior semicircular canal is most often affected because its anatomical orientation and gravitational dependency favour the buildup of displaced otoconia [4, 7]. The Dix-Hallpike manoeuvre, which reproduces vertigo and causes distinctive positional nystagmus, is used to confirm the clinical diagnosis of posterior canal BPPV [8].

Current clinical practice recommendations propose canalith repositioning manoeuvres as the first-line therapy because they directly target the underlying pathophysiology by relocating misplaced otoconia from the semicircular canal back into the utricle [6, 9]. The Semont manoeuvre is a popular liberatory treatment for posterior canal BPPV among the current Particle Repositioning Manoeuvres [10, 11]. It involves rapid lateral movements of the trunk and head, generating inertial forces that cause the displaced otoconia in the posterior canal to move back into the utricle [10, 12]. The method is an excellent alternative to conventional repositioning procedures since it does not require prolonged neck extension, which is especially beneficial for those with musculoskeletal limitations [13]. However, the quick and abrupt changes in the position required in the Semont manoeuvre may cause anxiety, nausea, cervical pain, and poor tolerance in older adults and patients with cervical limitations [1, 6]. The Dias repositioning manoeuvre has recently been introduced as a refined treatment for posterior canal BPPV, employing a more progressive and controlled supine-seated repositioning sequence of motions to reposition otoconia towards the utricle. This steady progression may enhance patient comfort and tolerance, particularly in those with neck stiffness, obesity, fear regarding quick positional changes, or other musculoskeletal constraints, while still allowing for adequate canalith relocation and symptom relief [14].

Despite the availability of multiple repositioning manoeuvres, clinical research is scarce comparing novel procedures like the Dias manoeuvre to established therapies like the Semont manoeuvre, particularly in the case of posterior canal BPPV. Identifying the most effective and clinically appropriate technique is critical for improving patient outcomes and directing evidence-based otolaryngology practice.

Thus, the purpose of this study is to evaluate and compare the efficacy of the Semont and Dias repositioning manoeuvres in patients with Posterior Canal Benign Paroxysmal Positional Vertigo.

METHODOLOGY

This study aimed to evaluate the efficacy of the Semont and Dias repositioning manoeuvres in patients suffering from posterior canal benign paroxysmal positional vertigo (PC-BPPV). Ethical approval for the study was obtained before data collection (CTRI Registration Number: CTRI/2024/08/072031), and the study was conducted at Vertigo Clinic in Vadodara for 11 months. A sample size of 30 patients with PC-BPPV was calculated using the G Power Software, and patients were allocated equally into two groups using convenience sampling. Inclusion criteria were: positive Dix-Hallpike test, patients falling into the

age group 21 to 60, both genders, and those who provided informed consent. Bilateral BPPV, anterior or horizontal canal involvement, other peripheral vestibular disorders (e.g., vestibular neuritis, labyrinthitis, Ménière's disease), central vestibular causes (e.g., stroke, multiple sclerosis, vestibular neuroma), severe cardiovascular conditions, significant systemic illness, cervical spine instability or vertebrobasilar insufficiency, cognitive impairment, severe mobility limitations, or pregnancy were all excluded. Outcome measures, the Vertigo Symptom Scale – Short Form (VSS-SF) and Dizziness Handicap Inventory (DHI), were measured at baseline, 1-hour post-intervention and 1-week post-intervention. Both groups were given a single session intervention of the respective manoeuvre.

Dias Repositioning Manoeuvre was administered in Group A (n = 15) guided by the therapist throughout the procedure. The participants were positioned in supine lying with a pillow kept at the chest level, neck was extended 20° and rotated 45° to the affected side. This position was maintained till 1 minute after the cessation of nystagmus, followed by rotating the head 135° towards the opposite side and maintaining it for 2 minutes. The participants were then brought into a sitting position while keeping their head tilted downward and rotated 45° to the affected side.

Semont Manoeuvre was administered in Group B. Participants were seated with their legs hanging off the examination table. The head was rotated 45 degrees toward the unaffected side, then quickly moved into a side-lying position on the affected side, which was held for 30 seconds or until the nystagmus stopped. The participants were then immediately moved to the opposite side-lying position without changing head orientation, and held there for another 30 seconds before returning to the sitting position.

Data were analysed using SPSS version 23; paired t-test for within-group and independent t-test for between-group comparisons (significance: $p < 0.05$).

RESULTS

The sample comprised 13 males (43.33%) and 17 females (56.67%). The age-wise distribution of the participants was as follows: 16.67% in 25–36 years, 36.67% in 37–48 years, and 46.67% in 49–60 years. Group A included 46.67% males and 53.3% females. Group B included 40% males and 60% females.

Table 1 - Comparison of pre-intervention outcome score & 1-hour post-intervention outcome score for Group A.

GROUP-A					
Outcome Measures	Pre-intervention score		1-hour post-intervention score		t-value
	Mean	SD	Mean	SD	
VSS-SF	15.53	6.42	3.20	2.46	11.01
DHI	47.33	13.43	10.67	1.13	12.24

*p-value <0.05 is considered statistically significant

Table 2 - Comparison of 1-hour post-intervention outcome score & post 1-week follow-up intervention outcome score for Group A

GROUP-A						
Outcome Measures	1-hour Post-intervention Score		Post 1 week Follow-Up Score		t-value	p-value
	Mean	SD	Mean	SD		
VSS-SF	2.8	1.86	0.80	0.94	4.97	<0.05
DHI	10.67	4.36	2.40	2.03	7.62	<0.05

*p-value <0.05 is considered statistically significant

Table 3 – Comparison of pre-intervention outcome score & post 1-week follow-up intervention outcome score of Group A

GROUP-A						
Outcome Measures	Pre- intervention Score		Post 1-week Follow-Up Score		t-value	p-value
	Mean	SD	Mean	SD		
VSS-SF	15.53	6.42	0.80	0.94	9.01	<0.05
DHI	47.33	13.43	2.40	2.03	12.73	<0.05

*p-value <0.05 is considered statistically significant

Table 4 – Comparison of pre-intervention outcome score and immediate post-intervention outcome score for Group B

GROUP-B						
Outcome Measures	Pre-intervention Score		Immediate Post-intervention Score		t-value	p-value
	Mean	SD	Mean	SD		
VSS-SF	19.20	6.54	5.47	2.88	11.71	<0.05
DHI	49.33	10.44	10.80	4.13	14.08	<0.05

*p-value <0.05 is considered statistically significant

Table 5 – Comparison of immediate post-intervention outcome score & 1-week follow-up intervention outcome score for group B

GROUP-B						
Outcome Measures	Immediate Post-intervention Score		1-week Follow-up intervention Score		t-value	p-value
	Mean	SD	Mean	SD		
VSS-SF	5.47	2.88	0.80	0.94	8.36	<0.05
DHI	10.80	4.13	6.27	2.96	4.95	<0.05

*p-value <0.05 is considered statistically significant

Table 6 – Comparison of pre-intervention outcome score & 1-week follow-up intervention outcome score for Group B

GROUP-B						
Outcome Measures	Pre-intervention Score		1-week Follow-up Score		t-value	p-value
	Mean	SD	Mean	SD		
VSS-SF	19.20	6.54	5.47	2.88	11.71	<0.05
DHI	49.33	10.44	10.80	4.13	14.08	<0.05

*p-value <0.05 is considered statistically significant

Table 7 – Comparison of Immediate Post-intervention outcome scores for Groups A & B

GROUP - A vs Group - B						
Outcome Measures	Group - A		Group - B		t-value	p-value
	Mean	SD	Mean	SD		
VSS-SF	2.80	1.86	5.47	2.88	3.02	>0.05
DHI	10.67	4.39	10.80	4.13	0.08	<0.05

*p-value <0.05 is considered statistically significant

Table 8 – Comparison of 1-week Follow-Up intervention outcome scores for Groups A & B

GROUP - A vs Group - B						
Outcome Measures	Group - A		Group - B		t-value	p-value
	Mean	SD	Mean	SD		
VSS-SF	0.60	0.74	0.73	0.80	0.47	>0.05
DHI	2.53	1.92	6.27	2.94	4.12	<0.05

*p-value <0.05 is considered statistically significant

DISCUSSION

The current study compared the Dias repositioning manoeuvre to the Semont manoeuvre in individuals with posterior canal benign paroxysmal positional vertigo (PC-BPPV). The results demonstrated that both interventions led to statistically significant improvements in vertigo severity and dizziness-related disability, as measured by the Dizziness Handicap Inventory (DHI) and Vertigo Symptom Scale-Short Form (VSS-SF), both immediately after treatment and at a one-week follow-up.

According to the participants' demographic profile, PC-BPPV was more common among those aged 49 to 60, with a mean age of approximately 46. This corresponds with earlier studies demonstrating that BPPV primarily affects middle-aged and older persons [4, 15, 16]. The greater incidence of PC-BPPV in this group can be explained by degenerative alterations in the otolithic membrane that cause otoconia to become dislodged and collect in the posterior semicircular canal [6, 17]. Furthermore, the current study found a larger percentage of females, which is in line with previous findings indicating a higher frequency of BPPV among women [16, 18]. This gender characteristic may be influenced by hormones, particularly decreased oestrogen levels that impact calcium metabolism and otoconia integrity [6, 19, 20, 21, 22].

Table 1, Table 2 and Table 3 demonstrated substantial improvements in both outcome measures following the Dias repositioning manoeuvre. The reduction in VSS-SF and DHI scores indicates

alleviation of vertigo symptoms and enhanced functional ability, respectively. These findings can be due to effective canalith repositioning, which allows displaced otoconia to migrate to the utricle [14]. Additionally, by promoting central vestibular compensation through neuroplastic mechanisms, repeated positional changes may improve postural control and sensory integration, which is supported by previous research [9, 23, 24].

Similarly, Table 4, Table 5 and Table 6 demonstrated that the Semont manoeuvre significantly reduced dizziness-related impairment as well as vertigo symptoms. The quick lateral motions involved in this manoeuvre provide inertial forces that allow otoconia to be immediately displaced from the posterior semicircular canal [25]. Previous research has strongly validated this mechanism, proving its efficacy in delivering immediate symptom alleviation and encouraging vestibular adaptation [10, 13].

Table 7 showed that both manoeuvres were equally successful in reducing dizziness-related handicap since there was no discernible change in DHI ratings after the intervention. However, a statistically significant difference was noted in VSS-SF scores immediately after intervention, favouring the Dias manoeuvre. This shows that, while both methods effectively treat the underlying disease, the Dias manoeuvre may provide better short-term alleviation of vertigo symptoms. The Dias manoeuvre's gradual, progressive execution may allow for more precise canalith repositioning while also reducing patient discomfort caused by sudden movements [14, 24].

Table 8 demonstrates that both groups continued to improve at the follow-up, denoting that the treatment benefits were sustained. The absence of a significant difference in VSS-SF scores at follow-up indicates that both manoeuvres yield similar long-term effects. These findings are consistent with previous research indicating that canalith repositioning manoeuvres, independent of method, are highly effective in restoring vestibular function and reducing symptom severity [1, 4, 26].

CONCLUSION

Both the Dias repositioning manoeuvre and the Semont manoeuvre effectively reduced vertigo symptoms and dizziness-related impairment in individuals with posterior canal BPPV. However, the Dias repositioning manoeuvre showed a substantially greater improvement in follow-up outcomes and may be a useful alternative repositioning strategy for PC-BPPV therapy.

LIMITATIONS

The study was restricted by its small sample size and short follow-up period. Treatment efficacy and long-term recurrence were not assessed. The results may potentially be less broadly applicable due to convenience sampling and single-centre recruiting.

DECLARATIONS

Ethical approval:

Ethical approval for this study was obtained through registration with the Clinical Trials Registry of India (CTRI) (Registration No.: CTRI/2024/08/072031). Written informed consent was obtained from all participants before their inclusion in the study.

Consent for publication:

Written informed consent for publication of anonymised data was obtained from all participants.

Competing interests:

The authors declare no competing interests.

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Author Contribution

Concept and design: JP, PL
Data collection: JP
Intervention and clinical execution: JP
Data analysis and interpretation: JP, PL
Manuscript drafting: JP, PL, EL, SR, DP
Critical revision of the manuscript: JP, PL, EL
Final approval of the manuscript: JP, PL, EL, SR, DP

Data availability:

The datasets generated during and analysed in the current study are available from the corresponding author upon reasonable request.

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