

Original Article

Comparative Effects of Semont Liberatory Maneuver and Gans Repositioning Maneuver on Vertigo and Dizziness in Patients with Posterior Canal Benign Paroxysmal Positional Vertigo (BPPV)

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ABSTRACT

Background: Benign paroxysmal positional vertigo (BPPV) is a prevalent vestibular disorder characterized by transient episodes of dizziness and imbalance, often triggered by changes in head position. The pathophysiology of BPPV is typically explained by the theories of cupulolithiasis and canalolithiasis, involving the dislodgment of otoconia within the semicircular canals. Despite the existence of various repositioning maneuvers for its management, there is ongoing research to determine the most effective treatment approach.

Objective: The study aimed to compare the efficacy of the Gans Repositioning Maneuver and the Semont Liberatory Maneuver in the management of posterior canal BPPV, evaluating their impact on symptom alleviation and quality of life improvement.

Methods: A randomized controlled trial was conducted with 46 participants (23 in each group) diagnosed with posterior canal BPPV. Participants were randomly allocated to receive either the Gans Repositioning Maneuver (Group A) or the Semont Liberatory Maneuver (Group B). The primary outcome measures included the Visual Vertigo Analogue Scale (VVAS) and the Dizziness Handicap Inventory (DHI), assessed before and after the intervention period. Statistical analysis was performed using SPSS version 25, with p-values less than 0.05 considered significant.

Results: Group A participants showed a reduction in VVAS scores from 65.13 ± 6.59 to 25.35 ± 0.93 , and in DHI scores from 44.96 ± 3.15 to 17.74 ± 3.77 . Group B participants demonstrated a decrease in VVAS scores from 64.00 ± 8.15 to 33.48 ± 7.72 , and in DHI scores from 46.17 ± 2.61 to 24.87 ± 1.32 . The improvements in both VVAS and DHI scores were statistically significant within and between groups ($p < 0.001$).

Conclusion: Both the Gans Repositioning Maneuver and the Semont Liberatory Maneuver are effective in significantly reducing the symptoms of BPPV, with notable improvements in VVAS and DHI scores. These findings support the incorporation of these maneuvers into clinical practice for the management of BPPV, offering significant symptom relief and enhancing patients' quality of life.

Keywords: Benign paroxysmal positional vertigo (BPPV), Gans Repositioning Maneuver, Semont Liberatory Maneuver, Visual Vertigo Analogue Scale (VVAS), Dizziness Handicap Inventory (DHI), vestibular disorder.

INTRODUCTION

Benign paroxysmal positional vertigo (BPPV) is a prevalent vestibular disorder characterized by episodic vertigo induced by changes in head position relative to gravity, with the posterior canal being the most commonly affected (1). This condition has been a focus of numerous studies aimed at identifying effective maneuvers for its management, particularly the Semont Liberatory Maneuver (SLM) and the Gans Repositioning Maneuver (GRM), each designed to address the displacement of otoliths within the semicircular canals of the inner ear, which is thought to be the underlying cause of BPPV (1, 2).

Research into the comparative efficacy of these maneuvers has been extensive and varied, reflecting a commitment to improving patient outcomes in the treatment of BPPV. One study by Omara et al. (2017) assessed the efficacy of GRM in comparison to the Epley repositioning maneuver, focusing on improvements in postural stability among older individuals with posterior canal BPPV. This randomized controlled experiment found no significant difference between the two groups in equilibrium scores, suggesting that GRM is as effective as the Epley maneuver in enhancing postural stability in this patient population (1, 3, 4).

Further investigation into the Semont Maneuver (SM) by Xiaoli Zhang et al. (2017) through a meta-analysis compared its influence on BPPV treatment against other techniques (5). The analysis, which included studies up to June 2015, showed that SM was not only comparable to the Epley maneuver and Brandt-Daroff exercises in terms of recovery rates, recurrence rates, and complications but also had a significantly higher resolution rate compared to controls, including sham treatments (6).

A study by Wanees M et al. (2015) compared the impact of a hybrid therapy involving the Gans maneuver, with or without post-maneuver restrictions, to canalith repositioning maneuvers (CRM) on the management of posterior canal BPPV (6). The study concluded that all patients showed improvement within their respective groups, with no significant differences among the groups in terms of the number of maneuvers required to resolve BPPV symptoms, highlighting the efficacy of GRM in the treatment regimen (2, 7, 8).

Alia Saberi et al. (2017) conducted a randomized clinical study to compare the immediate and short-term effects of the Epley and Gans maneuvers on BPPV patients. The results indicated a higher success rate in the Epley group on the first day post-treatment, but both maneuvers were found to be effective, with the Epley maneuver showing a slight advantage in terms of patient outcomes (2, 9).

Ashok Kumar et al. (2019) explored the effects of Epley-Semont and Brandt-Daroff maneuvers on the quality of life (QoL) in individuals suffering from posterior semicircular canal BPPV (10). The findings demonstrated notable improvements in QoL across all groups, with the Epley maneuver emerging as the preferred option for the management of PSCBPPV, followed by the Semont maneuver (10).

In addition to these studies, research by Muhammad Salman et al. (2022) evaluated the efficacy of the Epley and Semont's maneuvers for BPPV management, with and without the administration of Betahistine (6, 11). The study found no significant additional impact of Betahistine when combined with the repositioning maneuvers, indicating that the maneuvers alone are effective in managing BPPV symptoms and improving the quality of life (10, 12-14).

The research body surrounding the management of BPPV with SLM and GRM underscores a critical understanding of the condition's pathophysiology and the therapeutic potential of these maneuvers. While both maneuvers have been shown to be effective, the choice of maneuver may depend on individual patient characteristics, such as age, the severity of symptoms, and the presence of comorbidities like cervical spondylosis, which may influence the suitability and efficacy of a particular treatment approach (6, 15, 16).

Overall, the collective evidence from these studies suggests that both the Semont Liberatory Maneuver and the Gans Repositioning Maneuver offer valuable options for the treatment of BPPV, with comparable efficacy to other established maneuvers such as the Epley maneuver. Further research and clinical trials will continue to refine the understanding of these treatments, potentially leading to more personalized and effective management strategies for patients suffering from BPPV.

MATERIAL AND METHODS

The investigation was conducted as a Randomized Controlled Trial at various sites, including Mujahid Hospital Faisalabad, In-motion Physiotherapy and Rehabilitation Clinic, Allied Hospital Faisalabad, and District Head Quarter Hospital Faisalabad, over a duration of four months following the approval of the synopsis. To ascertain the sample size, the Open Epi tool was employed, utilizing data from a pertinent article, which resulted in a calculated sample size of 23 participants per group. Factoring in a 20% dropout rate, the total sample size was adjusted to 64 participants, with 31 in each group. This calculation was based on a desired study power of 80%, a level of significance set at 90%, an expected mean difference in outcome measures of 1.67, and standard deviations of 1.898 and 2.097 for groups A and B, respectively (14, 17).

A non-probability convenient sampling technique using the sealed envelope method was adopted for participant selection. Inclusion criteria were broad, encompassing both men and women aged between 18 to 65 years diagnosed with posterior canal BPPV, who exhibited vertigo with head position changes, were stable and cooperative, and had provided informed consent. Exclusion criteria included individuals outside the age range of 18 to 65, those with horizontal and anterior canal BPPV, and patients presenting vertigo symptoms associated with ataxia, migraine, headache, multiple sclerosis, central lesions, or cerebellar artery syndrome (14, 16).

Ethical considerations were meticulously observed, with approval obtained from the university's ethical committee in accordance with the Declaration of Helsinki. Participants' informed consent was secured, ensuring the confidentiality of their data, which was

safeguarded through password-protected systems and locked storage. The study highlighted that there were no adverse effects associated with the interventions, and participants were informed they could withdraw at any point without consequences (17, 18). Data collection commenced with the screening of participants based on the outlined criteria, followed by their random allocation into two experimental groups, A and B, through a sealed envelope method. Both groups underwent their respective intervention protocols over eight sessions spread across a month, with assessments conducted at baseline and after the fourth week. The interventions comprised the Semont Liberatory Maneuver for Group A, involving a series of positional changes designed to relocate dislodged otoliths within the inner ear, and the Gans Repositioning Maneuver for Group B, which similarly aimed at mitigating vertigo symptoms through specific head and body movements.

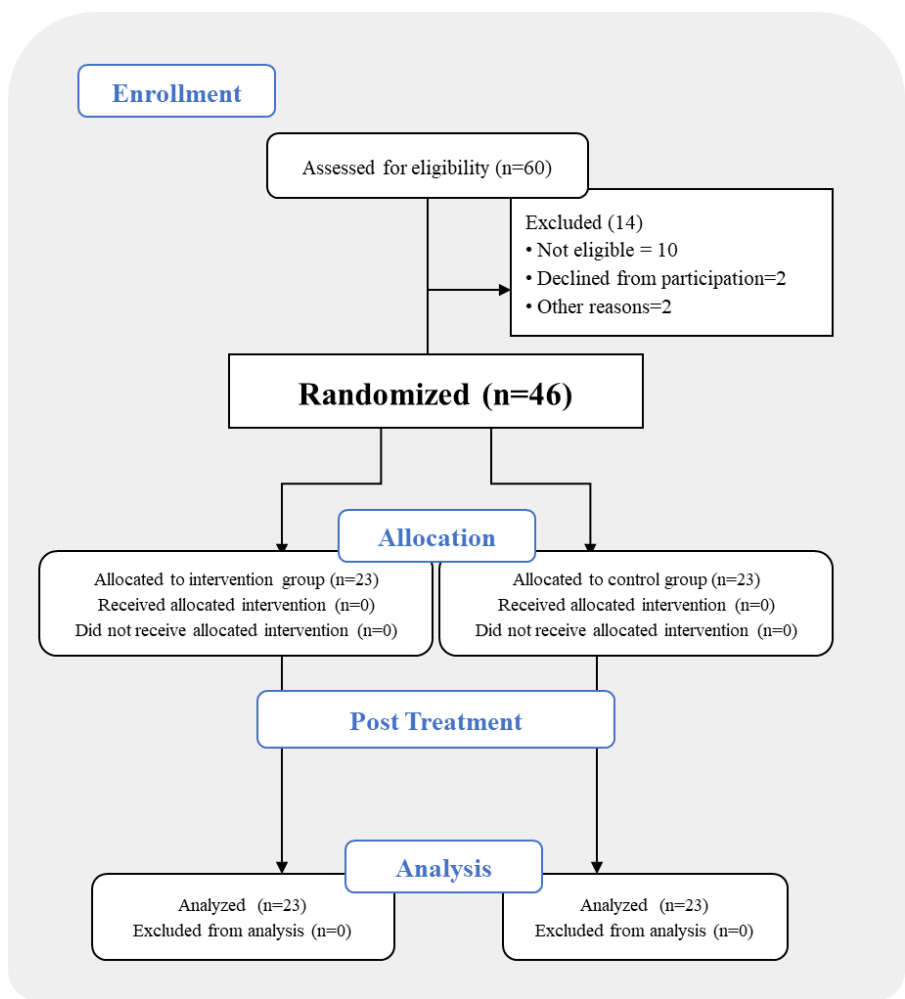


Figure 1 CONSORT FLOWCHART

Outcome measures included the Dix-Hallpike Test and the Side Lying Test as primary outcomes, with the Visual Vertigo Analogue Scale and the Dizziness Handicap Inventory serving as secondary outcomes. The Dix-Hallpike Test was employed to confirm the presence of BPPV, involving a specific maneuver to induce and observe nystagmus, indicative of BPPV. The Side Lying Test, alternatively, was used for diagnosing BPPV with the patient in a side-lying position to elicit vertigo symptoms. The Visual Vertigo Analogue Scale provided a subjective measure of visual vertigo symptoms, and the Dizziness Handicap Inventory quantitatively assessed the impact of dizziness on daily functioning (14, 16).

Data analysis was conducted using SPSS version 25, employing mean and standard deviation calculations for quantitative variables, such as age and gender. The Shapiro-Wilk test assessed data normality, with non-parametric tests applied due to deviations from normality. The Friedman test compared within-group differences pre- and post-intervention, and the Mann Whitney U test was used for between-group comparisons, with a significance level set at $p \leq 0.05$.

RESULTS

In the conducted study, participant demographics and BMI distribution were meticulously assessed, revealing significant insights into the characteristics of individuals undergoing treatment for posterior canal Benign Paroxysmal Positional Vertigo (BPPV) with either the Semont Liberatory Maneuver (Group A) or the Gans Repositioning Maneuver (Group B). The age distribution highlighted a notable prevalence of older adults in both treatment groups, particularly within Group A, where over half of the participants (52.2%) fell into the 57-64 age bracket. This contrasted with Group B, which exhibited a broader age range distribution, including a significant portion (43.5%) of participants aged between 49-56 years. Gender distribution across both groups leaned towards a higher representation of females, accounting for 65.2% in Group A and an even higher proportion, 73.9%, in Group B. The BMI categorization of participants further illuminated the study's demographic profile, with a significant number of individuals classified as obese. Specifically, Group A had a notable majority (52.2%) falling into the obese class I category, whereas Group B displayed a more distributed pattern across the overweight and obese categories [Table 1].

Table 1 Participant Demographics and BMI Distribution

Demographic	Category	Group A: Semont Liberatory Maneuver (n=23)	Group B: Gans Repositioning Maneuver (n=23)
Age Group (Years)	33-40	17.4%	-
	41-48	13.0%	26.1%
	49-56	17.4%	43.5%
	57-64	52.2%	30.4%
Gender	Male	34.8%	26.1%
	Female	65.2%	73.9%
BMI	18.5-24.9 Normal	4.3%	-
	25-29.9 Overweight	17.4%	26.1%
	30-34.9 Obese	26.1%	34.8%
	35-39.9 Obese Class I	52.2%	39.1%

Table 2 Outcomes of Visual Vertigo Analogue Scale (VVAS) and Dizziness Handicap Inventory (DHI)

Outcome Measures	Group A: Before Treatment	Group A: After Treatment	Group B: Before Treatment	Group B: After Treatment	p-value
Visual Vertigo Analogue Scale (VVAS)	65.13	25.35	64.00	33.48	< 0.001
Dizziness Handicap Inventory (DHI)	44.96	17.74	46.17	24.87	< 0.001

The study's outcomes, as measured by the Visual Vertigo Analogue Scale (VVAS) and the Dizziness Handicap Inventory (DHI), provided compelling evidence of the effectiveness of both treatment maneuvers in substantially alleviating symptoms of BPPV. Prior to the intervention, Group A reported a mean VVAS score of 65.13, which significantly reduced to 25.35 following treatment. Similarly, Group B demonstrated a decrease in VVAS scores from an initial mean of 64.00 to 33.48 post-treatment. These improvements were statistically significant, with a p-value of less than 0.001, underscoring the substantial reduction in visual vertigo symptoms in both groups [Table 2].

Furthermore, the Dizziness Handicap Inventory scores corroborated the VVAS findings, indicating significant improvements in the participants' perceived handicap due to dizziness. Group A experienced a notable reduction in DHI scores from 44.96 before treatment to 17.74 afterwards. Group B also showed considerable improvement, with DHI scores decreasing from 46.17 to 24.87. The changes observed in both groups were highly significant, as reflected by a p-value of less than 0.001, highlighting the maneuvers' efficacy in reducing the dizziness-related handicap among individuals suffering from BPPV [Table 2].

DISCUSSION

In the exploration of effective management strategies for benign paroxysmal positional vertigo (BPPV), this study embarked on comparing the Gans Repositioning Maneuver with the Semont Liberatory Maneuver, drawing upon established concepts of "cupulolithiasis" and "canalithiasis" to elucidate the pathophysiology behind BPPV symptoms. Notably, the study's demographic analysis revealed a significant representation of older adults across both intervention groups, aligning with findings from similar research conducted by Alia Saberi in Iran and an Egyptian study, which collectively underscore the prevalence of BPPV across a broad age spectrum (11, 19, 20). Furthermore, the gender distribution in this study, with a higher female predominance, resonates with Gupta's observation of a skewed gender ratio favoring female participants in BPPV studies (2).

The effectiveness of both maneuvers in alleviating the symptoms of BPPV was quantitatively assessed using the Visual Vertigo Analogue Scale (VVAS) and the Dizziness Handicap Inventory (DHI), revealing significant post-treatment improvements within both groups. These findings are bolstered by the statistical analysis, which demonstrated a marked reduction in VVAS and DHI scores post-intervention, thereby affirming the efficacy of these maneuvers in mitigating the discomfort and handicap associated with BPPV.

Such outcomes are reflective of the broader literature, where interventions targeting the mechanical dislodgment of otoconia have been shown to offer substantial relief to BPPV sufferers.

The study also delved into the Body Mass Index (BMI) distribution among participants, uncovering a notable prevalence of obesity within the cohort. This aspect of the demographic profile, though not the primary focus of the study, adds an intriguing layer to the discussion on BPPV management, suggesting a potential avenue for future research on the interplay between body weight and vestibular disorders (2, 3, 21).

Despite the promising results, the study acknowledges its limitations, including a relatively small sample size and the potential for selection bias stemming from the diagnostic criteria employed. Moreover, the focus on dizziness to the exclusion of balance disturbances may have resulted in the underrepresentation of BPPV patients experiencing primarily balance-related symptoms. These limitations underscore the need for a cautious interpretation of the findings, with an understanding that the generalizability of the results to broader populations may be constrained (6, 9, 10, 22, 23).

In light of these considerations, several recommendations are posited for future research. An extended follow-up period, coupled with a larger and more diverse sample size, would enhance the robustness of the findings and facilitate a more nuanced understanding of the long-term efficacy of BPPV interventions. Additionally, further exploration into the frequency and precision of maneuver execution, particularly in self-administered contexts, could offer valuable insights into optimizing treatment protocols for improved patient outcomes (3, 7, 11).

Ultimately, this study contributes to the growing body of evidence supporting the use of repositioning maneuvers in the management of BPPV, while also highlighting the complexities inherent in treating this condition. Through a thoughtful integration of current findings with existing literature, and by acknowledging the study's limitations, this research paves the way for future investigations aimed at refining BPPV management strategies for enhanced patient care.

CONCLUSION

This study substantiates the efficacy of both the Gans Repositioning Maneuver and the Semont Liberatory Maneuver in managing benign paroxysmal positional vertigo (BPPV), demonstrating significant improvements in symptoms as measured by the Visual Vertigo Analogue Scale (VVAS) and the Dizziness Handicap Inventory (DHI). The findings, despite the study's limitations such as a small sample size and potential selection bias, provide compelling evidence supporting these maneuvers as valuable interventions for BPPV patients. The implications of this research extend to clinical practice, underscoring the importance of incorporating these repositioning maneuvers into the treatment repertoire for BPPV, thereby offering patients a non-invasive, effective option for symptom relief and enhancing their quality of life. Future studies are encouraged to address the limitations identified, exploring the long-term efficacy of these treatments and their optimization for broader patient demographics.

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