Research Article

The Efficacy of the Gans Repositioning Maneuver in Comparison with the Epley Maneuver in Elderly Patients with Benign Paroxysmal Positional Vertigo

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Citation: Fazelifard A, Ashrafi M. The Efficacy of the Gans Repositioning Maneuver in Comparison with the Epley Maneuver in Elderly Patients with Benign Paroxysmal Positional Vertigo. Aud Vestib Res. 2025;34(2):144-50.

https://doi.org/10.18502/avr.v34i2.18057

Highlights

- Benign Paroxysmal Positional Vertigo (BPPV) is the most common vestibular disorder
- Gans maneuver is an effective and safe treatment for elderly patients with PC-BPPV

Article info:
Received: 16 May 2024
Revised: 07 Jul 2024
Accepted: 07 Jul 2024

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ABSTRACT

Background and Aim: Benign Paroxysmal Positional Vertigo (BPPV) impacts the quality of life of affected people, especially the elderly. The Epley maneuver and the Gans maneuver are used to treat Posterior Canal BPPV (PC-BPPV). The effectiveness of the Epley maneuver has been verified, but further studies are required to prove the effectiveness of the Gans maneuver. The main purpose of the current study was to compare the effectiveness of the Gans maneuver with the Epley maneuver in the treatment of the elderly with PC-BPPV, considering emotional, physical, and functional symptoms by assessing anxiety, dizziness, and quality of life after treatment.

Methods: Sixty-three elderly patient (74.38±5.34 years) with unilateral PC-BPPV were recruited in this study. They were randomly assigned to two groups. The experimental group received the Gans maneuver, and the control group received the Epley maneuver. All patients completed the Persian version of the Dizziness Handicap Inventory (DHI) and Vestibular Rehabilitation Benefit Questionnaire (VRBQ) before, 48 hours and 1 month after treatment. Recurrence rate was assessed after the 2-month follow up.

Results: Significant differences were observed between pre-treatment and post-treatment questionnaire outcomes for both study groups; nevertheless, in each phase of the study, there were no significant differences between the two groups in the DHI and VRBQ scores.

Conclusion: Both the Gans maneuver and Epley maneuver were almost equally effective and made elderly with PC-BPPV report a better condition in terms of anxiety, emotional factors and quality of life after receiving the maneuvers.

Keywords: Benign paroxysmal positional vertigo; Epley maneuver; Gans repositioning maneuver

Introduction

Benign Paroxysmal Positional Vertigo (BPPV) is one of the most common peripheral vestibular disorders (2.4% in the general population), of which dislodged otoliths (otoconia) from the utricle migrate to the Semi-Circular Canals (SCCs) leading to symptoms of vertigo [1-3]. When the crystals migrate to the posterior semi-circular, then PC-BPPV happens. PC-BPPV is the most common form of BPPV (approximately 80% of BPPV cases) [4]. BPPV causes severe, brief episodes of vertigo attacks with nystagmus. These symptoms begin with a short delay and are followed by a change in the head position relative to gravity [5]. The prevalence of BPPV increases in older adults [6]. Although BPPV is benign, it can negatively impact the quality of life of affected people, especially the elderly, by reducing postural stability and increasing the risk of falls [7, 8]. It also affects their well-being by creating physical and psychological consequences [9, 10]. Therefore, accurate and timely diagnosis for instant and proper treatment of BPPV is important.

The Dix-Hallpike test is a clinical diagnostic test for PC-BPPV [10, 11]. Performing this maneuver causes vertigo and positional nystagmus in affected people. The nystagmus is rotational toward the affected ear and has an upbeat component [12, 13]. In this maneuver, the patient sits on the examination table while the head is turned 45 degrees towards the affected ear. The patient is then moved to the supine position with the head hyperextended 20 degrees [14, 15]. In another form of this test (modified Dix-Hallpike), the examiner is located behind the patient's head (instead of being next to the patient) and supports the patient's neck and back. This method, while more comfortable for both the patient and the examiner, provides a better view for the examiner to observe the patient's eye movements [16]. Generally, the use of vestibular suppressant drugs is not recommended for the treatment of BPPV, except in severe cases and for short-term control of symptoms. Various studies about the effectiveness of vestibular suppressant drugs in the treatment of vestibular disorders have shown that although they can relieve annoying symptoms (nausea or vomiting) in the acute phase of vertigo, they can interfere with the central compensation mechanism. Furthermore, the side effects related to these drugs should also be considered. These drugs usually cause drowsiness and increase the risk of falls, especially in the elderly [17].

On the other hand, physical therapy maneuvers have been proven to be highly effective in the treatment of BPPV [18, 19]. One of the best maneuvers that is used for the treatment of PC-BPPV is the Epley maneuver. This maneuver consists of a set of head and body movements that lead to the migration of otoliths from the posterior semicircular canals and finally enter into the utricle. Currently, repositioning maneuvers are the gold standard for the treatment of BPPV [20].

Although the Epley maneuver can successfully reposition otoconia particles, it also has limitations and may have some complications. It can be dangerous or at least painful for the elderly. This is due to the fact that these patients usually have other problems in their cervical area or back and may suffer from vertebrobasilar insufficiency [16]. The Gans Repositioning Maneuver (GRM) is a hybrid maneuver that combines the two Epley and Semont maneuvers. In this maneuver, there is no need to expose elderly patients to harmful or painful motions. Therefore, it can be an alternative for the treatment of PC-BPPV in the elderly. In this maneuver, the patient sits on the examination table. Their head is turned 45° away from the affected ear, and the patient's position is changed into a side-lying position on the affected side. The second position is a roll from the affected side to the unaffected side. Then, a liberatory headshake is done, and after that, the patient is returned to the primary seated position [16]. The main purpose of the current study was to assess the efficacy of the GRM compared to the Epley maneuver in the treatment of the elderly with posterior semicircular canal BPPV, considering emotional, physical, and functional symptoms by assessing the anxiety, dizziness, and quality of life after treatment.

Methods

Sixty-three patients with unilateral PC-BPPV were included in this randomized study conducted from February to November 2023. We recorded data from the patients at Alborz audiology and balance clinic in Karaj, Iran. All patients were selected according to the eligibility criteria and signed a written informed consent document prior to enrollment in the study. All patients underwent several examinations, including otoscopy,

tympanometry and nystagmus observation under infrared goggles in a Videonystagmography (VNG) test. The diagnosis was based on the case history (episodes of rotatory vertigo for less than a minute in changing head position) and clinical examination (positive Dix-Hallpike test). Patients with a history of cervical spine injuries, patients who did not meet the age range criterion, patients taking anti-vertigo medication, patients with a previous diagnosis of Meniere's disease, migraine, or vestibular neuritis and patients with a previous history of neurological diseases were excluded from the study. The patients were divided into two control group (Epley) and an experimental group (GRM) at random. Both groups were matched for age and gender. In the beginning, all patients filled out the Persian version of the Dizziness Handicap Inventory (DHI) and Vestibular Rehabilitation Benefit Questionnaire (VRBQ). DHI is a self-assessment questionnaire that is used to assess and measure the presence of symptoms of imbalance and dizziness. This questionnaire contained 25 items and 3 subscales: Physical (DHI-P), Functional (DHI-F) and Emotional (DHI-E) [21]. VRBQ is a self-assessment questionnaire that is used to assess and measure the effects of vestibular disorder on the quality of life and psychological health of patients. This questionnaire has 22 questions and 5 subscales: dizziness (VRBQ-D), Anxiety (VRBQ-A), Symptoms (VRBQ-S), Quality of life (VRBQ-Q) and Motion-provoked dizziness (VRBQ-M) [22]. The control group received the Epley maneuver and the experimental group received the Gans repositioning maneuver. One therapist performed the maneuvers. The Gans repositioning maneuver was performed according to the protocol introduced by Roberts et al. [16]. The Epley maneuver was carried out according to the guideline of BPPV [17]. After 48 hours, all subjects were reevaluated using the modified Dix-Hallpike test, and all patients filled out the DHI and VRBQ questionnaires again. This process was repeated after a month. The recurrence was also followed up through telephone interviews for up to two months after the first intervention. Patients with recurrences were asked to return to the clinic. In the clinic, after performing the modified Dix-Hallpike maneuver, if the recurrence was confirmed, it was registered as recurrence. In the end, the results were compared.

Statistical analysis

We used descriptive statistical tests to analyze the data. The Kolmogorov-Smirnov statistical test was applied to check the normality of the data, and the outcomes of the DHI and VRBQ questionnaires were analyzed using the ANOVA test. The Bonferroni test was used to compare the Epley and GRM groups in different phases of the study. We also evaluated the rate of recurrence by using Fisher's exact test. Data analysis was conducted using SPSS 17, and p-value less than 0.05 was considered statistically significant.

Results

A total of 63 patients were enrolled for the study procedure. They were assigned randomly into two groups: the Epley group (32 patients) and the GRM group (31 patients). The Epley group ranged in age from 62–82 years (mean 73.31±5.66) and consisted of 20 (62.5 %) women and 12 (37.5%) men. The GRM group ranged in age from 66–85 years (mean 75.48±4.85) and also consisted of 18 (58.2%) women and 13 (41.9%) men. The groups were matched in respect of gender and age (p=0.108 and 0.719, respectively).

The overall and subscale scores of VRBQ and DHI questionnaires at pretreatment and post-treatment phases in both groups are indicated in Table 1. The DHI overall score in three different phases of the study in both groups are showed in Figure 1. According to the results, in general, the effect of time was significant in both groups ($p<0.001$). in both Epley and GRM groups, the overall and subscale scores of the DHI questionnaire changed significantly at 48 hours and one month after treatment ($p<0.001$). This means that both Gans and Epley maneuvers were effective in reducing the score of DHI questionnaire.

The interaction effects between time (period) and group, as well as the between-group effect, were not significant for the DHI overall score and the scores of its subscales, including DHI-P, DHI-F, and DHI-E (p=0.22, p=0.97, p=0.72, p=0.47 respectively). This indicated that the reaction of the experimental group GRM to Gans maneuver in each phase of the study was similar to the reaction of the Epley group to Epley maneuver.

The VRBQ overall score in three different phases of the study in both groups are showed in Figure 2. The results also showed that in general, the effect of time was significant in both groups ($p<0.001$). In both Epley and GRM groups, the overall and subscale scores of the

Table 1. Summary of the questionnaire results (mean±SD)

Questionnaires	Control group			Experimental group			Partial eta squared
	Before	After 48 h	After 1 month	Before	After 48 h	After 1 month	
DHI	58.69±4.86	21.88±3.21	11.56±2.95	60.13±3.72	21.16±3.09	11.81±2.85	0.006
DHI-physical	21.31±1.73	9.94±2.35	4.06±1.87	21.29±1.75	10.06±1.82	4.06±1.97	0.001
DHI-functional	20.19±2.46	6.88±1.64	5.13±1.83	20.58±2.49	6.65±1.74	5.29±1.97	0.002
DHI-emotional	17.28±2.63	5.06±1.93	2.38±1.18	18.26±2.41	4.45±1.69	2.45±1.34	0.009
VRBQ	73.41±2.58	40.25±3.88	14.31±4.15	72.55±2.14	39.77±2.72	12.81±4.25	0.041
VRBQ-dizziness	4.88±1.24	1.38±1.18	0.31±0.64	4.35±1.17	0.97±0.79	0.29±0.46	0.006
VRBQ-anxiety	12.78±0.83	8.63±0.49	4.16±1.37	12.97±0.95	8.61±0.52	3.71±1.42	0.038
VRBQ-motion-provoked dizziness	21.37±1.02	13.69±1.09	3.59±1.88	20.84±1.07	13.48±0.81	3.39±1.89	0.013
VRBQ-quality of life	34.75±1.88	16.56±3.34	6.25±2.95	34.39±1.41	16.77±2.46	5.42±3.31	0.011
VRBQ-symptoms	38.66±1.47	23.69±1.31	8.06±2.88	38.16±1.66	23.73±1.21	7.39±2.59	0.052

DHI; dizziness handicap inventory, VRBQ; vestibular rehabilitation benefit questionnaire

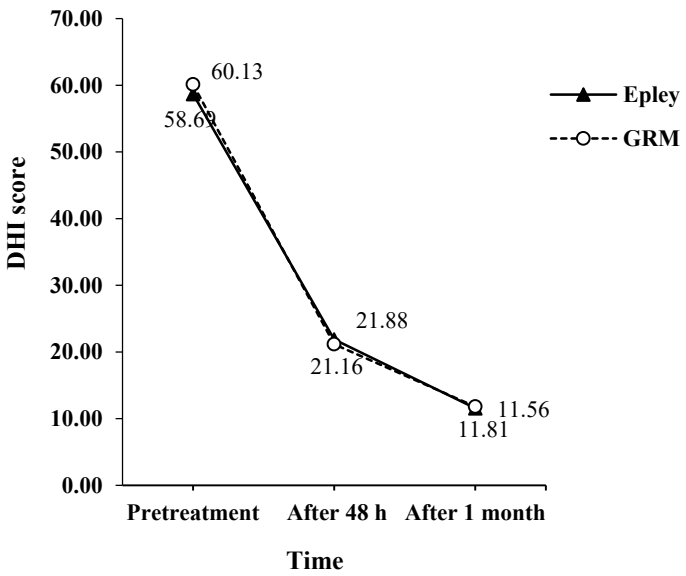

Figure 1. Comparison of dizziness handicap inventory scores of Epley and Gans repositioning maneuver groups in three different phases of the study. DHI; dizziness handicap inventory, GRM; Gans repositioning maneuver

VRBQ questionnaire changed significantly at 48 hours and one month after treatment ($p<0.001$) and This means that Both Gans and Epley maneuvers were effective in reducing the score of VRBQ questionnaire.

The interaction effects between time (period) and group, as well as the between-group effect, were not significant for the VRBQ overall score and the scores of its subscales, including VRBQ-S, VRBQ-M, VRBQ-D, VRBQ-A, and VRBQ-Q ($p=0.11$, $p=0.07$, $p=0.37$, $p=0.56$, $p=0.13$, $p=0.42$ respectively). This indicated that the reaction of the GRM group to Gans maneuver in each phase of the study was similar to the reaction of the Epley group to Epley maneuver.

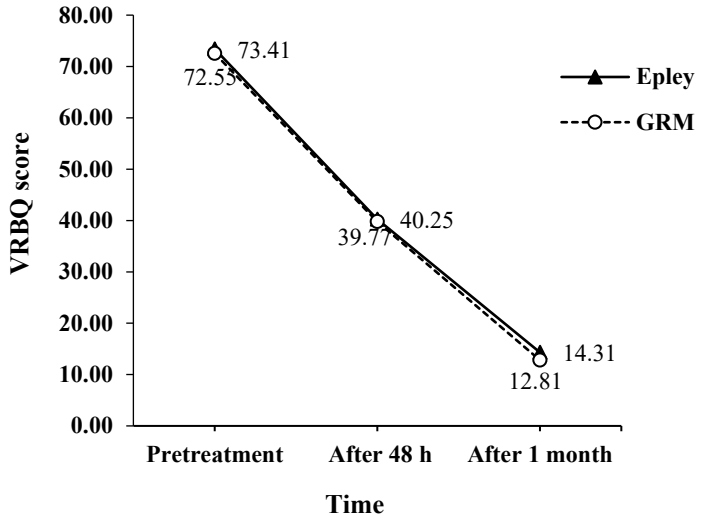

Figure 2. Comparison of vestibular rehabilitation benefit questionnaire scores of Epley and Gans repositioning maneuver groups in three different phases of the study. VRBQ; vestibular rehabilitation benefit questionnaire, GRM; Gans repositioning maneuver

In this study, the success rate of the treatment (resolution of nystagmus and vertigo), after performing first maneuver, was 51.61% in the GRM group and 59.37% in the Epley group. Thirty-eight and seven percent of patients in GRM groups and 34.37% in the Epley group had successful treatment after tow maneuvers. Finally, tow people in the Epley group and three people in the GRM group were treated after three maneuvers. Therefore, the average number of maneuvers required for resolution of nystagmus and vertigo in Epley and GRM groups was 1.4 and 1.5 respectively.

The rate of recurrence was evaluated using Fisher's exact test. After two months of follow-up, 1 person in the Epley group (3.1%) and 1 person in the GRM group (3.2%) had a recurrence of symptoms. The results of Fisher's exact test showed that the difference between the GRM group and the Epley group was not significant in terms of recurrence (p=1.062).

Discussion

The Gans maneuver is a new treatment that could be described as combination of Semont and Epley maneuver. In this study, we tried to assess the efficacy of the Gans repositioning maneuver compared to the Epley maneuver in the treatment of the elderly with PC-BPPV when it comes to the alleviation of psychometric symptoms and the rate of successful treatment. In both the Epley group and GRM group, the overall and subscales scores of VRBQ and DHI questionnaires had significantly decreased in 48 hours and one month after treatment. The results revealed that both maneuvers are equally effective and can reduce the symptoms of vertigo and anxiety. In this study, the between-group effect was not significant for the VRBQ and DHI questionnaire scores. This indicated that the reaction of the patients of each group to the performed maneuver was similar. In terms of recurrence rate, both groups had almost the same situation. Our study indicated that GRM as a safe and effective treatment for PC-BPPV could be used to resolve the dislodged otoliths (otoconia) from the semicircular canals and improve the psychometric symptoms for the patients.

In general, the findings of this study were consistent with the results of previous similar studies and approved the effectiveness of this therapeutic technique. Roberts et al. assessed the effectiveness of GRM and found it a useful treatment for PC-BPPV. In their study 80.2% of the participants were successfully treated after one GRM treatment, 95.6% clear after a second treatment [16]. In our study these numbers were 51.6% and 90.3%. It is worth noting that their sample size was bigger, however, the average age of participants in our study was higher than theirs. In Dispenza et al. study, GRM was a more comfortable option for people with hip or cervical problems in comparison with the Epley and Semont maneuvers [23]. Badawy et al. found that the GRM is effective for the treatment of posterior canal BPPV and

also noted that the post-maneuver restrictions did not have a positive effect on the efficacy of this maneuver [24]. Their sample size was smaller than our study. In Saberi et al. study, the efficacy of the GRM was similar to the Epley maneuver. However, the rate of cervical pain was significantly higher in the group receiving the Epley maneuver. In their study, the authors stated that longer follow-up studies are needed in the future [25]. In our study, we followed the patients for one month. Omara et al. made comparison between the efficacy of Grm with Epley maneuver in improving the postural stability of elderly patients with PC-BPPV. Their sample size was smaller than our study [26]. In Gayathri et al. study, the sample size consisted of patients with PC-BPPV who also had cervical spine injuries. The results showed that Gans repositioning maneuver was a safe and effective maneuver for the treatment of these patients [27]. Dhiman et al. study was conducted with higher sample size and lower average age. The recurrence rate was 4.12% in group receiving the Epley maneuver and 2.19% in group receiving the Gans maneuver [28]. In our study, these numbers were 3.12% and 3.22%, respectively.

In spite of our promising results with utilization of Gans repositioning maneuver, long-term studies with bigger sample size and also in patients with neck, back and hip mobility comorbidities may be needed to confirm its effectiveness and safety.

Conclusion

The present study showed that the effectiveness of the Gans repositioning maneuver in the treatment of elderly patients with posterior canal benign paroxysmal positional vertigo is similar to the Epley maneuver. Gans repositioning maneuver, as an effective and safe treatment for elderly patients with posterior canal benign paroxysmal positional vertigo, can reduce the symptoms of vertigo. After this intervention, the patients reported improvements in anxiety, emotional factors, and overall quality of life.

Ethical Considerations

Compliance with ethical guidelines

This paper has been submitted to Shahid Beheshti University of Medical Sciences with Ethical Code No. IR.SBMU.RETECH.REC.1402.330.

Funding

This research did not receive any grant from funding agencies in the public, commercial, or non-profit sectors.

Authors' contributions

AF: Study design, acquisition of data, statistical analysis, interpretation of the results, drafting the manuscript; MA: Study design and Supervision, interpretation of the results, revision of the manuscript.

Conflict of interest

The authors declare that they have no conflict of interest.

Acknowledgments

This paper has been extracted from A. Fazelifard. MSc thesis submitted to Shahid Beheshti University of Medical Sciences. We would like to thank the personnel of the Alborz Hearing and balance clinic in Karaj for their cooperation.

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