

Philadelphia College of Osteopathic Medicine

DigitalCommons@PCOM

PCOM Physician Assistant Studies Student
Scholarship

Student Dissertations, Theses and Papers

2020

Is the Gans Maneuver effective in reducing symptoms of vertigo in patients diagnosed with PC-BPPV?

Bryan Carter

Philadelphia College of Osteopathic Medicine

Follow this and additional works at: https://digitalcommons.pcom.edu/pa_systematic_reviews



Part of the [Medicine and Health Sciences Commons](#)

Recommended Citation

Carter, Bryan, "Is the Gans Maneuver effective in reducing symptoms of vertigo in patients diagnosed with PC-BPPV?" (2020). *PCOM Physician Assistant Studies Student Scholarship*. 547.

https://digitalcommons.pcom.edu/pa_systematic_reviews/547

This Selective Evidence-Based Medicine Review is brought to you for free and open access by the Student Dissertations, Theses and Papers at DigitalCommons@PCOM. It has been accepted for inclusion in PCOM Physician Assistant Studies Student Scholarship by an authorized administrator of DigitalCommons@PCOM. For more information, please contact library@pcom.edu.

Is the Gans Maneuver effective in reducing symptoms of vertigo in patients diagnosed with PC-BPPV?

Bryan Carter, PA-S

A SELECTIVE EVIDENCE BASED MEDICINE REVIEW

In Partial Fulfillment of the Requirements For

The Degree of Master of Science

In

Health Sciences – Physician Assistant

Department of Physician Assistant Studies
Philadelphia College of Osteopathic Medicine
Philadelphia, Pennsylvania

February 14th, 2020

ABSTRACT

OBJECTIVE: The objective of this selective EBM review is to determine whether or not “Is the Gans Maneuver effective in reducing symptoms of vertigo in patients diagnosed with PC-BPPV?”

STUDY DESIGN: Review of three peer-review journal published, single-blinded randomized controlled trials all in the English language with human subjects on patients with PC-BPPV.

DATA SOURCES: The three randomized controlled trials that were utilized for this review were found using PubMed, Cochrane Collaboration & Google Scholar. Articles were selected based on relevance to the proposed clinical question and the inclusion of outcomes with evidence that matters to these patients.

OUTCOME(S) MEASURED: All of the articles selected measured the subjective absence of vertigo symptoms using some variation of a clinical tool after performing the Gans maneuver.

RESULTS: Badawy et al. compared the Gans maneuver with post-therapeutic restrictions to a Canalith repositioning maneuver (modified Epley maneuver with post-therapeutic restrictions). Saberi et al. compared the Gans maneuver to the modified Epley maneuver. Muragod et al. compared the Gans maneuver to the Epley maneuver. All of the studies researched showed a statistically significant reduction in vertigo symptoms after receiving the Gans maneuver. Badawy et al. demonstrated that the reduction of vertigo symptoms over 1 month was an average of 9 out of 10 for the Gans maneuver with PTR when compared to the canalith repositioning maneuver (modified Epley with PTR) at 8 out of 10 change from baseline. Saberi et al. demonstrated that the average percentage of patients with subjective resolution of vertigo symptoms was 46.7% for the Gans maneuver and 70% for the modified Epley maneuver. Muragod et al. demonstrated that the average point change from baseline out of 100 on the DHI was 42.9 for the Gans maneuver and 44.9 for the Epley maneuver.

CONCLUSIONS: The data presented by these three single-blinded RCTs suggests that the Gans maneuver is an effective alternative treatment for patients with PC-BPPV in reducing symptoms of vertigo. Future research is warranted with a larger sample size on the adverse side effects & relapse of symptoms for the Epley vs Gans maneuver.

KEY WORDS: PC-BPPV, Gans Maneuver

INTRODUCTION

Benign positional paroxysmal vertigo (BPPV) is an inner ear disorder of which otoliths from the utricle are often dislodged & move to the semi-circular canals leading to symptoms of vertigo.¹ PC-BPPV refers to BPPV specifically when the crystals move to the posterior semi-circular canal. BPPV is one of the most common causes of vertigo symptoms and is usually the direct result of a change in position by the patient.

Benign positional paroxysmal vertigo is one of the most common causes of vertigo symptoms. About 8% of all patients with moderate to severe vertigo symptoms are a direct result of BPPV.² Although nearly one tenth of patients with moderate to severe vertigo symptoms are due to BPPV, only about 8% of those patients are receiving treatment that is considered adequate when helping to alleviate their symptoms.² It has been shown that 86% of BPPV patients experience symptoms that either disrupt daily activities or cause them to miss work days, which is important for determining the severity of a disorder for patients.² Not only can BPPV become a financial burden on these patients due to specialist treatment copays/costs & missed work days but it is also noted to cost patients in excess of over \$2,000 for the misuse of medical resources.³ One of the most common symptoms of BPPV includes some aspect of dizziness whether that be the room spinning around the patient or the feeling that the patient themselves is spinning but the room is not. Due to the wide differential of disorders & diseases that could be causing these symptoms, these patients are often prompted to be evaluated by specialty medical personnel. About 18% of visits to dizziness clinics⁴ and 20% of pediatric referrals⁵ are due to worsening symptoms of BPPV. These patients are often evaluated and sent for additional testing to help rule out other diseases while trying to confirm the diagnosis. About one quarter of all vestibular testing is used by patients with the disorder.⁶

Currently, the exact cause of BPPV is unknown but it can often be the result of head trauma, surgery of the ear, prolonged prone positioning & vestibular degeneration. When small crystals are dislodged from the inner ear, they often move into the semicircular canals which contain fluid & hair cells causing a disruption of balance.⁷ Specific types of movements or repositioning of any kind can cause these patients to have a flareup of debilitating symptoms. These crystals primarily allow patients to experience gravity allowing them to maintain their balance within a space. When these crystals are dislodged from the inner ear, they often get caught in the posterior canal with over 90% of BPPV patients having some form of posterior canal involvement.⁸ With this disorder being the result of repositioning and movement, it has been shown to be prevalent in all demographics. Most commonly, patients with BPPV are often over 50 years old with a slight predilection for female when compared to males.⁷ Slowly over time, the fluid and hair cells within the inner ear are often damaged and become easier to disrupt causing dizziness symptoms. For patients under the age of 50, the most common cause of BPPV is due to some type of head trauma.⁸ Any direct blow to the head can dislodge these crystals from the inner ear causing a cascade of symptoms until the crystals settle or are repositioned back to where they were before. The most common symptoms that are prevalent with BPPV include dizziness, room spinning and balance issues. ⁷ As a result of these dizziness symptoms, patients often feel nauseous which can result in intermittent episodes of vomiting. In the most severe cases, patients who experience intractable vomiting can result in dehydration with lab imbalances and subsequent hypovolemic shock.

Currently, the standard for diagnosing BPPV is via the Dix-Hallpike maneuver. This maneuver includes having the provider turn the patients' head 45 degrees towards the affected side while they are sitting and then quickly helping the patients lie supine with their head

hanging slightly off of the head of the table. For the next 30 seconds, the provider will be observing for symptoms of nystagmus which then they may repeat on the opposite side. Due to the nature of the disorder, BPPV can be treated with repositioning maneuvers. Currently, the most effective and gold standard treatment includes canalith-repositioning maneuvers: specifically, the Epley maneuver. In a medical office, a practitioner may perform the Epley maneuver while sending patients home with a list of at-home Brandt-Daroff exercises.⁷ The Epley maneuver includes having a medical provider turn the patients' head 45 degrees towards the affected side while they are sitting and then quickly helping the patients lie supine with their head hanging slightly off of the head of the table. After waiting for 30 seconds, the provider will turn the patients' head 90 degrees and as a result 45 degrees towards the unaffected side. After waiting for 30 seconds, the patient will then roll over onto their side while the provider holds their head into position before helping them to sit back up straight. Brandt-Daroff exercises are repositioning exercises that can often be found online and performed at home to help alleviate & prevent symptoms of BPPV from returning. As symptoms continue to progress and worsen, patients are often seen in the office for the Epley maneuver to be performed. These repositioning movements are often able to dislodge the canaliths with a complete resolution of symptoms without being too invasive for patients. Additional therapies for BPPV include a variety of medicinal treatments such as: vestibular suppressants, anticholinergics, antihistamines and benzodiazepines.⁹ Although these treatments can be effective in reducing the immediate symptoms of the disorder such as nausea & vomiting, they are are not often effective in managing the disease long-term. For the most severe cases, surgical removal of the dislodged canaliths can be performed by specialists; however, these procedures are rare.⁷

The Epley maneuver is a well-accepted treatment for BPPV. However, canalith repositioning treatments can be harmful in older patients and those with orthopedic issues, carotid insufficiency & vertebrobasilar insufficiency.⁸ Older patients and those with orthopedic issues such as spinal fusions or osteoarthritis of the neck are often unable to perform these quick movements due to a limited range of motion. The Epley maneuver can often aggravate their pain symptoms and lead to additional complications such as fractures or vascular damage.⁸ For those with carotid & vertebrobasilar insufficiency, lowering the head of the patient below the table and quickly repositioning the neck of these patients can often disrupt the blood-flow to the brain further exacerbating their current disease. Disrupting the blood-flow to the brain of those with already insufficient blood-flow can result in transient or permanent ischemia to the subsequent areas. The combination of both the Epley maneuver's mixed efficacy as well as the exclusion of certain patient populations has led to many additional repositioning maneuvers throughout the years. The Gans maneuver utilizes mechanical help in the form of sheets and towels to help facilitate smoother movements which may be used as an effective alternative to the Epley maneuver for those who cannot tolerate it. This paper evaluates three randomized controlled trials (RCTs) comparing the efficacy of the Gans maneuver in reducing symptoms of vertigo in those diagnosed with PC-BPPV.

OBJECTIVE

The objective of this selective EBM review is to determine whether or not "Is the Gans Maneuver effective in reducing symptoms of vertigo in patients diagnosed with PC-BPPV?"

METHODS

When completing the article search for this review, the author investigated PubMed, Cochrane Collaboration & Google Scholar web databases using the key words "PC Benign

Paroxysmal Positional Vertigo” & “Gans maneuver”. All of the articles selected were published in peer-reviewed journals in the English language and selected based on relevance to the proposed clinical question with the inclusion of outcomes with evidence that matters to these patients (POEMs).

The three articles selected for this review focused specifically on a patient population that was clinically diagnosed with posterior canal benign positional paroxysmal vertigo. The intervention under review includes the Gans maneuver which is an alternative treatment to the comparison group and well-accepted treatment of BPPV, the Epley maneuver. The selected articles measured the reduction of vertigo symptoms via self-report using various tools. All three of these articles included single-blinded randomized controlled trials.

Inclusion criteria included randomized controlled trials that were published in English after January 2015. Additional inclusion criteria included studies that only used human subjects and those evaluation only patients diagnosed with PC-BPPV. Exclusion criteria included studies that were published in 2014 or earlier, used non-human subjects and patients that were not diagnosed with PC-BPPV. Demographics, inclusion criteria & exclusion criteria are summarized in Table 1. A summary of statistics reported within these studies includes mean change from baseline, percent of patients with subjective resolution of symptoms, NNT & p-values.

OUTCOMES MEASURED

All of the articles selected measured the subjective absence of vertigo symptoms using some variation of a clinical tool after performing the Gans maneuver. The first article measures the subjective report of intensity of vertigo symptoms using a Visual Analog Scale. The second article measures the subjective absence of vertigo symptoms at 1 week via patient self-report. The last article measures the resolution of dizziness symptoms at 1 week using the Dizziness

Table 1. Demographics & Characteristics of the three included RCTs

Study	Type	No. Pts	Age (yrs)	Inclusion Criteria	Exclusion Criteria	W/D	Interventions
Badawy (2015) ¹	RCT	45	GRM: 44.1±8 CRM: 42.3±8.1	Patients diagnosed with unilateral PC-BPPV via Dix-Hallpike maneuver	Patients with symptoms lasting >2 months, previous surgery in the involved ear or disease affecting vestibular function rather than BPPV (vestibular neuritis, labyrinthitis, Meniere's disease or central lesions of the dorsal medulla)	15	Gans repositioning maneuver only vs Control repositioning maneuver (modified Epley maneuver)
Saberi (2017) ⁸	RCT	73	GRM: 46.7±7.5 ERM: 46.9±13.4	Patients diagnosed with PC-BPPV via Dix-Hallpike maneuver with no other neurologic or otologic symptoms.	Patients with severe systemic disorders preventing them from participating in the maneuvers, consumption of tranquilizers & anti-vertigo medications recently or during follow-up & not referring for follow-up.	13	Gans repositioning maneuver vs Epley maneuver
Muragod (2016) ¹⁰	RCT	30	GRM: 49.9±14.8 ERM: 54.5±12.3	Patients diagnosed with PC-BPPV with (+) Dix-Hallpike.	Patients with central vertigo, VBI, musculoskeletal problems of the neck & back, & neurologic problems.	0	Gans repositioning maneuver vs Epley maneuver

Handicap Inventory (DHI) survey. This is a patient self-reported questionnaire that quantifies the impact of dizziness of a patients' daily activities. There are 25 questions with a maximum score of 100 where each "yes" is counted as 4 points, "sometimes" is counted as 2 points and "no" is counted as 0 points. Any score 16+ is considered mild handicap, 36+ is considered moderate handicap and a score of 54+ is considered severe handicap.

RESULTS

The three utilized randomized controlled trials observed the efficacy of the Gans maneuver when compared to the Epley maneuver for treatment of PC-BPPV. The demographics & characteristics of the included studies were not significantly different when comparing the two treatment groups (Table 1). Only one of the three articles used dichotomous data with no articles stating the use of "intention-to-treat" analysis.^{1,8,10} The relative benefit increase (RBI), absolute benefit increase (ABI) and numbers needed to treat for Saberi et al. were calculated using the experimental event rate (EER) and control event rate (CER) when comparing the efficacy of vertigo symptom resolution of the Gans maneuver and the modified Epley maneuver.⁸ Two of the three studies included patients who were excluded by the author due to variations in treatment courses or loss to follow-up (Table 1).

In Badawy et al., a total of 45 patients diagnosed with unilateral PC-BPPV via Dix-Hallpike maneuver were included from an audiology outpatient office in Egypt.¹ Exclusion criteria included patients with severe systemic disorders preventing them from participating in the various maneuvers, patients who consumed tranquilizers or anti-vertigo medications recently or during follow-up and those patients who were lost to follow-up (Table 1). Patients were randomized into three groups including the treatment group by Gans maneuver with post-therapeutic restrictions (PTR), the Gans maneuver without restrictions and the Canalith

repositioning-maneuver (modified Epley with post-therapeutic restrictions). The results of the second treatment group including the Gans maneuver without restrictions was excluded from the review by the author to compare more similar treatment courses (15 participants).¹ Prior to treatment, patients diagnosed with PC-BPPV via the Dix-Hallpike maneuver were asked to perform a subjective vertigo intensity rating (VIR) via the Visual Analog Scale (VAS), rating the severity of their vertigo symptoms from 0-10 (0 being no symptoms to 10 being the most severe symptoms). After having the randomly assigned treatment performed, patients were re-evaluated weekly using the VAS for 4 weeks and then finally at 1 month.¹ After treatment for 1 month, the Gans maneuver with post-therapeutic restrictions and Canalith Repositioning-Maneuver (modified Epley with post-therapeutic restrictions) were observed to reduce the vertigo intensity rating on average 9/10 and 8/10 respectively. There was a statistically significant difference in regard to relief of vertigo symptoms ($p < 0.001$) indicating that the estimate of treatment effect is precise.¹ The results are summarized in Table 2.

Table 2. Gans maneuver vs Canalith-repositioning maneuver at 1 month.

Treatment Group	Average Pre-treatment VIR	Average Post-treatment VIR at 1 month	Mean Change from baseline
GRM with PTR	9	0	9
CRM with PTR	8.5	0.5	8

In Saberi et al., a total of 30 patients diagnosed with PC-BPPV via Dix-Hallpike maneuver with no other neurologic or otologic symptoms were included from the Guilan University of Medical Sciences.⁸ Exclusion criteria included patients with symptoms lasting >2 months, those who had prior surgery of the affected ear or disease affecting vestibular function other than BPPV which includes vestibular neuritis, labyrinthitis, Meniere's disease, central lesions of the dorsal medulla, etc. (Table 1). Patients were randomized into three groups

including the treatment group by Gans maneuver and the modified Epley maneuver. Patients diagnosed with PC-BPPV were surveyed regarding the subjective absence of vertigo symptoms after the Dix-Hallpike maneuver was performed via Patient Self-Report post-treatment.⁸ After having the randomly assigned treatment performed, patients were re-evaluated at 1 week. At 1 week, the percentage of patients with subjective resolution of vertigo symptoms for the Gans maneuver and modified Epley maneuver were 46.7% and 70% respectively with an NNT of 5. There was no statistically significant difference when comparing the two groups ($p = 0.067$) indicating that the estimate of treatment effect is not precise.⁸ The results are summarized in Table 3.

Table 3. Gans maneuver vs modified Epley maneuver at 1 week

	CER	EER	RBI	ABI	NNT	p-value
% Sx Resolution	0.70	0.467	x	x	x	x
Calculated Values	x	x	0.333	0.233	5	0.067

In Muragod et al., a total of 73 patients diagnosed with unilateral PC-BPPV via Dix-Hallpike maneuver with KLES Dr Prabhakar Kore Hospital and Medical Research Center Belgavi.¹⁰ Exclusion criteria included patients with central vertigo, VBI, musculoskeletal problems of the neck & back or additional neurologic problems (Table 1). Patients were randomized into two groups including the treatment group by Gans maneuver and the Epley maneuver. Patients diagnosed with PC-BPPV were assessed prior to treatment and 1 week after utilizing the dizziness handicap inventory (DHI).¹⁰ The DHI includes a subjective survey of vertigo symptoms based on a scale of 100 points in regard to severity. At 1 week, the Gans and Epley maneuvers were observed to have an average reduction of 42.9 and 44 points on a 100-point DHI scale respectively. There was no statistically significant difference when comparing

the two groups ($p = 0.51$) indicating that the estimate of treatment effect is not precise.¹⁰ The results are summarized in Table 4.

Table 4. Gans maneuver vs Canalith-repositioning maneuver at 1 week.

Treatment Group	Average Pre-treatment DHI	Average Post-treatment DHI at 1 week	Mean Change from baseline
Gans maneuver	58.8	15.8	42.9
Epley maneuver	60.4	15.4	44.9
p-value			0.510

DISCUSSION

The Gans Maneuver was effective in reducing symptoms in vertigo in patients diagnosed with PC-BPPV as shown by the three RCTs utilized in this systematic review. Badawy et al. demonstrated an average of complete resolution in symptoms after 1 month with the Gans Maneuver shown in Table 2.¹ Saberi et al. demonstrated more than 46% of patients having complete resolution of symptoms after 1 week with treatment of the Gans maneuver shown in Table 3.⁸ Muragod et al. demonstrated >70% reduction in symptoms after 1 month with treatment of the Gans maneuver shown in Table 4.¹⁰ Although Badawy et al. did not include a p-value between groups, both Saberi et al. & Muragod et al. showed no statistically significant difference between the two treatments.^{1,8,10} Badawy et al. did include a p-value of <0.001 regarding statistical significance of all treatments being effective in the reduction of vertigo symptoms.¹ Not having larger sample sizes with a placebo group & double blinding of the studies provides some limitations of these results.

More abrupt and rapid canalith repositioning treatments can be harmful in an older population and those with orthopedic or vascular issues.⁸ The Gans Maneuver utilizes various mechanical help in the form of sheets and/or towels to help facilitate these movements while effectively repositioning the canaliths within the inner ear. The movements are less abrupt and smoother, allowing for a bed-rolling technique that becomes effortless for the provider and less

harmful for those patients who may have a relative contraindication to the Epley Maneuver. A provider of any specialty has the skillset to perform the Epley maneuver after the Dix-Hallpike which creates an easy transition of training for an alternative treatment in the Gans maneuver. A limitation to this maneuver would include access issues and appropriate training. A 2017 governmental survey found out that only 28% of US adult men and 17% of adult women had a primary care physician with the access being worse for minority groups.¹¹ Fixing the current access issue and implementing better training of alternative treatments could help patients have their medical issues effectively treated by a PCP without inappropriate utilization of medical resources in seeing a Specialist (ex. ENT or Neurology for PC-BPPV). Another limitation of this study includes the exclusion of some patients with long-term symptoms (>2 months), recent medication use or co-existing neurologic issues.

CONCLUSION

This systematic review investigated three single-blinded randomized controlled trials to determine if the Gans Maneuver was effective in reducing symptoms in vertigo in patients diagnosed with PC-BPPV. The data presented demonstrates that the Gans Maneuver is an effective treatment of vertigo symptoms for patients with PC-BPPV. Canalith-repositioning maneuvers continue to be the treatment of choice for PC-BPPV but this new evidence suggests that the Epley maneuver may not be the appropriate first line treatment in certain patients with relative contraindications. This research suggests that the Gans maneuver is an effective alternative to the Epley maneuver which can be used in all patients. Further study is warranted regarding the adverse side effects of the Epley vs Gans maneuver or a repeat study in patients within an older population or those with orthopedic/vascular issues. Further study with a larger sample size is also warranted regarding relapse of symptoms for the Epley vs Gans maneuver.

References

1. Badawy WM, Gad El-Mawla EK, Chedid AE, Mustafa AH. Effect of a hybrid maneuver in treating posterior canal benign paroxysmal positional vertigo. *J Am Acad Audiol.* 2015;26(2):138-144. doi: 10.3766/jaaa.26.2.4 [doi].
2. von Brevern M, Radtke A, Lezius F, et al. Epidemiology of benign paroxysmal positional vertigo: a population based study. *J Neuro, Neurosurg and Psych.* July 2007. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2117684/>. Accessed October 6, 2019.
3. Li JC, Li CJ, Epley J, Weinberg L. Cost-effective management of benign positional vertigo using canalith repositioning. *J Am Acad Otolaryngol-Head and Neck Surg.* March 2000. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/10699805>. Accessed October 5, 2019.
4. Nedzelski JM, Barber HO, McIlmoyl L. Diagnoses in a dizziness unit. *J of Otolaryngol.* April 1986. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/3712537>. Accessed October 5, 2019.
5. Wiener-Vacher SR. Vestibular disorders in children. *International J Audiol.* September 2008. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/18821227>. Accessed October 6, 2019.
6. Hughes CA, Proctor L. Benign paroxysmal positional vertigo. *The Laryngoscope.* May 1997. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/9149161>. Accessed October 1, 2019.
7. Mayo Clinic. Benign paroxysmal positional vertigo (BPPV). June 30, 2018. Available from: <https://www.mayoclinic.org/diseases-conditions/vertigo/symptoms-causes/syc-20370055>. Accessed October 1, 2019.
8. Saberi A, Nemati S, Sabnan S, Mollahoseini F, Kazemnejad E. A safe-repositioning maneuver for the management of benign paroxysmal positional vertigo: Gans vs. Epley maneuver; a randomized comparative clinical trial. *Eur Arch Otorhinolaryngol.* 2017;274(8):2973-2979. <https://www.ncbi.nlm.nih.gov/pubmed/27488837>. Accessed December 4, 2018. doi: 10.1007/s00405-016-4235-7 [doi].
9. Hain TC. Drug Treatment of Vertigo. *Drug treatment of Vertigo.* <https://www.dizziness-and-balance.com/treatment/drug/drugrx.html>. Accessed October 3, 2019.
10. Muragod AR, Kumar S, Zingade ND. Comparitive study of effectiveness of epleys maneuver vs gans maneuver in BPPV. *Indian J Physiother Occup Ther.* 2016;10(2):176-180. doi: 10.5958/0973-5674.2016.00071.X.
11. Finnegan J. Many Americans don't have a primary care doctor. *Fierce Healthcare website.* January 12, 2017. Available from: <https://www.fiercehealthcare.com/practices/many-americans-don-t-have-a-primary-care-doctor>. Accessed January 3, 2020.