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Original Research Article

Retrospective Analysis of the Outcome of the Patients with Benign Paroxysmal Positional Vertigo (BPPV) Treated with Different Maneuvers

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Abstract

Background: Benign paroxysmal positional vertigo (BPPV) is the most common cause of peripheral vertigo, characterized by brief episodes of dizziness triggered by head movements. It results from dislodged otoliths within the semicircular canals, leading to abnormal vestibular signaling. Various repositioning maneuvers, including the Epley, Semont, and Brandt-Daroff exercises, are used for symptom resolution, but their comparative effectiveness remains a subject of clinical interest.

Objective: This study aims to analyze and compare the outcomes of different repositioning maneuvers in patients with BPPV in terms of symptom resolution, recurrence rates, and treatment efficacy.

Methods: A retrospective observational study was conducted at PMCH from February 2023 to August 2024. A total of 40 patients diagnosed with BPPV based on clinical evaluation and the Dix-Hallpike test were included. Patients received Epley, Semont, or Brandt-Daroff treatment. Medical records were analysed for treatment outcomes, recurrence rates within 1–3 months, and side effects. Statistical analysis was performed using SPSS software, with a p-value <0.05 indicating significance.

Results: The Epley manoeuvre demonstrated the highest success rate, with 88.9% of cases resolved and 11.1% of recurrences. The Semont manoeuvre was also effective, with a 75% resolution rate and a 25% recurrence rate. The Brandt-Daroff exercises had the lowest success rate (50%) and the highest recurrence rate (40%). None of the groups encountered significant challenges. The results of treatment varied significantly between the manoeuvres ($p<0.05$).

Conclusion: Epley manoeuvre is the best BPPV treatment due to its efficacy and low recurrence. Semont manoeuvres are still possible, but Brandt-Daroff drills should be avoided. Additional research is recommended to confirm these findings.

Keywords: BPPV, Epley Maneuver, Semont Maneuver, Vestibular Rehabilitation, Retrospective Study.

Introduction

Common benign paroxysmal positional vertigo (BPPV) affects 20-30% of dizziness clinic patients [1]. Short attacks of inner ear vertigo result from sudden head posture shifts. Otoconia, calcium carbonate crystals, transfer from the utricle into semicircular canals, generally the posterior canal, causing BPPV [2]. Free-floating otoliths cause brief but severe vertigo by disrupting endolymphatic fluid dynamics. Rolling over in bed, looking up, or leaning forward causes BPPV vertigo for a few seconds to a minute. A patient's quality of life and capacity to perform daily tasks may be greatly reduced by nausea, vomiting, imbalance, or fear of falling [3]. Although benign, BPPV can affect functional status, especially in the elderly, and increase the risk of falls and injury. Clinical history and positional tests like the Dix-Hallpike technique, which causes nystagmus, confirm the diagnosis. BPPV is common, however it is often misdiagnosed or poorly managed, causing unnecessary treatments and suffering [4]. Because BPPV causes poor daily functioning, anxiety, depression, and frequent vertigo episodes, it affects quality of life. Many BPPV sufferers avoid public and limit their mobility due to vertigo fears. Elderly falls induced by sudden dizziness can cause fractures, hospitalisations, and health deterioration [5]. Untreated or long-term BPPV can cause chronic vertigo, vestibular compensation failure, and movement confidence issues [6]. Needless imaging, incorrect therapies, and frequent physician consultations increase healthcare costs, making BPPV costly. To minimise its impact on people and healthcare systems, BPPV must be

addressed swiftly and effectively. Some BPPV cases resolve on their own, but many need support to manage their symptoms and prevent recurrence. Treatment focusses on moving misplaced otoconia to the utricle to restore vestibular function. Canalith repositioning movements (CRMs), the BPPV gold standard, cause this effect.

The Epley manoeuvre is the most common BPPV repositioning manoeuvre. The Epley procedure uses head and body motions to remove otoliths from the injured semicircular canal and return them to the utricle. Results show that 70% to 90% of patients have symptom relief after one session [7]. The Semont technique removes and shifts otoconia with fast side-lying motions.

This procedure is often used when a patient's movement is too low for the Epley manoeuvre. However, self-administered Brandt-Daroff alignment techniques can accommodate misplaced otoconia. Brandt-Daroff exercises are often suggested to patients with repeated or resistant BPPV, however repositioning movements relieve symptoms faster. Gufoni and BBQ roll manoeuvres are needed to treat horizontal canal BPPV, which is rarer and harder to treat. Even though these techniques are available, their efficacy, recurrence rates, and patient adherence are still debated.

The disparities in clinical outcomes among movements require treatment efficacy comparisons. The Epley procedure is the gold standard for treating posterior canal BPPV, but some patients have recurrence within weeks or months. Although the Semont technique is equally effective, it may be superior for some patients [8].

Self-administered exercises like Brandt-Daroff may appeal to some patients due to their convenience and accessibility. Given these variances, optimal treatment approach optimisation needs knowing which move yields the best long-term benefits. Age, comorbidities, and BPPV subtype are patient-specific characteristics that affect therapy success, whereas some studies demonstrate that the Epley or Semont movements must be repeated for full resolution.

In the first year after therapy, BPPV recurrence is still common, with rates between 10% and 30% [9] To improve patient outcomes and alter treatment guidelines, establish which movement minimises recurrence and maximises immediate symptom relief.

This study will compare BPPV patients at Patna Medical College and Hospital (PMCH) across multiple repositioning manoeuvres. Looking back at study patient records, we want to see how different movements affected symptom alleviation, recurrence rates, and patient satisfaction. This study will reveal the best strategies to treat benign prostatic hyperplasia (BPPV), which may influence how primary care physicians and vestibular problem experts manage patients. BPPV is so stressful on individuals and healthcare systems that developing improved treatments is essential for improving patient well-being and reducing unnecessary medical interventions.

This comparison aims to increase BPPV care data and assist clinicians choose the best treatment for their patients with actionable advice.

Methodology

Study Design: In this retrospective observational study, numerous repositioning procedures are tested for treating benign paroxysmal positional vertigo (BPPV). Medical records of BPPV patients who had different canalith repositioning manoeuvres will be evaluated for the study. Since it is retrospective, the study uses clinical data rather than real-time patient follow-up.

Study Setting: The research is done at Patna Medical College and Hospital (PMCH), a tertiary care centre that handles many vertigo and vestibular illness patients. BPPV patients' expert treatment makes the facility ideal for testing various movements.

Study Duration: The study uses patient data from February 2023 to August 2024 to evaluate therapy efficacy and recurrence. This length allows for sufficient follow-up to determine symptom remission and relapse.

Sample Size: A total of 40 patients diagnosed with BPPV were included in the study. The sample size was determined based on the availability of medical records and the feasibility of retrospective data collection within the study duration.

Inclusion Criteria

- To ensure a uniform study population, the following inclusion criteria were applied:
- Patients diagnosed with BPPV based on clinical history, symptoms, and a positive Dix-Hallpike test (confirming posterior canal BPPV).
- Patients who underwent treatment with one of the three maneuvers: Epley maneuver, Semont maneuver, or Brandt-Daroff exercises.
- Patients with complete medical records documenting pre-treatment and post-treatment symptoms, recurrence, and follow-up data.

Exclusion Criteria

- Certain conditions that could confound the study results were excluded:
- Patients diagnosed with central vertigo due to neurological conditions such as stroke or multiple sclerosis.

- Patients with vestibular migraine, which can mimic BPPV symptoms but requires different treatment approaches.
- Patients with incomplete medical records or those lost to follow-up before adequate treatment response assessment.
- Patients with other neurological disorders affecting balance and vestibular function.

Data Collection: We reviewed the medical records of inclusion patients to get demographic and clinical data Patient demographics like age, gender, and medical history were collected to determine treatment outcomes. Positive Dix-Hallpike and symptoms confirmed benign paroxysmal positional vertigo (BPPV), eliminating those without a history. Classifying treatment manoeuvres as Epley, Semont, and Brandt-Daroff helps compare efficacy. We monitored medical records for symptom improvement and recurrence after the manoeuvre. We checked follow-up records to see if more therapy was needed and how well each strategy prevented symptom return.

Statistical Analysis: Statistical analysis was done with SPSS for accuracy and reliability. The patient population, baseline factors, and treatment efficacy were described using descriptive statistics. Compare the three therapy groups on categorical factors like symptom resolution and recurrence rates using a chi-square test. Continuous factors like symptom resolution time after each technique were tested with an independent t-test. Statistically significant p-values below 0.05 indicated therapeutic efficacy differences. This systematic scientific approach helps BPPV clinical treatment by objectively evaluating repositioning procedures.

Results

Patient Demographics: The study comprised 40 patients who were diagnosed with benign paroxysmal positional vertigo (BPPV). The mean age of the patients was 50.3 ± 12.6 years, with a range of 30 to 75 years. The gender distribution indicated a higher prevalence in females (65% female, 35% male), which is consistent with previous epidemiological findings that BPPV is more prevalent in women. The average duration of symptoms prior to seeking treatment was 4.2 ± 1.8 weeks, with some patients reporting that their symptoms persisted for as long as 8 weeks.

Table 1: Patient Demographics

Variable	Mean ± SD / Percentage
Total Patients	40
Age (Years)	50.3 ± 12.6
Gender	65% Female, 35% Male
Duration of Symptoms (weeks)	4.2 ± 1.8

Treatment Groups: Patients were assigned to one of three treatment groups according to the manoeuvre they underwent. The Epley manoeuvre was the most frequently employed treatment (n = 18, 45%), with the Semont manoeuvre (n = 12, 30%) and the Brandt-Daroff exercises (n = 10, 25%) following in that order.

Table 2: Distribution of Patients by Treatment Maneuver

Treatment Maneuver	Number of Patients (%)
Epley Maneuver	18 (45%)
Semont Maneuver	12 (30%)
Brandt-Daroff Exercises	10 (25%)

Outcome Measures

Symptom Resolution Rate: Based on the resolution of symptoms within one week of treatment, the overall efficacy of each manoeuvre was assessed. The highest success rate was demonstrated by the Epley manoeuvre, with 16 out of 18 patients (88.9%) experiencing full symptom relief. In contrast, the Brandt-Daroff exercises had the lowest success rate, with only 5 out of 10 patients (50%) having complete symptom relief, while the Semont manoeuvre had a 75% resolution rate (9 out of 12 patients).

Recurrence Rate: Differences in recurrence rates were identified during a follow-up assessment conducted at one to three months. The recurrence rate for patients who underwent the Epley manoeuvre was 11.1% (2 out of 18 patients), whereas the Semont manoeuvre group had a 25% recurrence rate (3 out of 12 patients). In contrast, the Brandt-Daroff group exhibited the highest recurrence rate at 40%, which pertains to four out of ten patients.

Table 3: Treatment Outcomes of Different Maneuvers

Outcome Measure	Epley Maneuver	Semont Maneuver	Brandt-Daroff
Symptom Resolution (%)	88.9% (16/18)	75% (9/12)	50% (5/10)
Recurrence Rate (%)	11.1% (2/18)	25% (3/12)	40% (4/10)
Side Effects (%)	5.5% (1/18)	8.3% (1/12)	10% (1/10)

Side Effects: Nausea, dizziness, and transient imbalance were among the rare side effects associated with the manoeuvre. The Epley manoeuvre group had the lowest overall incidence of side effects (5.5%), followed by the Semont manoeuvre (8.3%) and the Brandt-Daroff exercises (10%). After the manoeuvre, the majority of the side effects were mild and subsided within a few hours.

Statistical Comparison of Maneuver Effectiveness: A chi-square test was employed to compare the three therapy groups based on categorical criteria, including symptom alleviation and recurrence rates. The Epley technique had a more significant impact on symptom resolution than Brandt-Daroff exercises, as demonstrated by the statistical analysis ($p < 0.05$). The Epley technique was found to accelerate symptom resolution ($p = 0.03$), as evidenced by an independent t-test. The Epley technique has the lowest recurrence rate and the most effective relief of BPPV symptoms, according to the results. The Semont technique has a higher recurrence rate, despite the fact that it reduces symptoms. Brandt-Daroff exercises are the least effective, resulting in higher recurrence rates and a lower degree of symptom remission. This demonstrates the significance of implementing the appropriate repositioning procedure for BPPV patients in order to improve treatment outcomes and reduce the likelihood of recurrence.

Discussion

This retrospective study evaluates benign paroxysmal positional vertigo (BPPV) treatments. The Epley procedure was the most effective of the three repositioning approaches, with 88.9% symptom remission and 11.1% recurrence. Despite its 25% recurrence rate, the Semont manoeuvre has a 75% resolution rate. Only half of patients experienced full symptom alleviation with Brandt-Daroff exercises, while 40% had recurrence. Our findings support previous research that canalith repositioning manoeuvres like the Semont and Epley procedures relieve BPPV symptoms better than habituation exercises like the Brandt-Daroff method. These data show similar tendencies to previous research. This study supports earlier findings that the Epley technique has an 80-90% success rate [10,11]. Our findings support recent studies that show the Semont technique is nearly as effective as the Epley manoeuvre but has a greater recurrence rate. Physically disabled patients who cannot do repositioning manoeuvres are encouraged to conduct Brandt-Daroff exercises, which have poorer efficacy and a slower symptom remission period. These comparisons show that systematic repositioning is better than habituation-based workouts. There are many reasons why the three therapy groups have different results. Repositioning otoliths from the posterior semicircular canal back into the utricle makes the Epley procedure more efficient at vertigo relief. Semont manoeuvre's success rate and recurrence are similar, however the latter may be due to its faster movement to achieve the same goal. Brandt-Daroff exercises may have a poorer symptom remission rate and higher recurrence since they use habituation motions instead of repositioning. Patient compliance is crucial, especially for home-based exercises like Brandt-Daroff, where poor execution or irregular practice might reduce efficacy.

Each move has pros and cons. Most posterior canal BPPV patients prefer the Epley technique because it works well and is easy to do. However, some individuals may feel dizzy or nauseated during operation. The Semont technique is successful but requires a rapid motion that some patients, especially the elderly or those with mobility limitations, may find uncomfortable. Patients who cannot travel to a clinic for repositioning movements might undertake less effective Brandt-Daroff exercises at home. Unfortunately, their long recovery time and frequent recurrence make them unsuitable as first-line treatments. The therapeutic effects of these studies emphasise the importance of customising technique selection to patient factors. For most posterior canal BPPV, the Epley technique should be the primary treatment due to its high success rate and limited recurrence. For patients who react poorly to the Epley procedure, the Semont manoeuvre may be utilised. Patients who cannot perform repositioning manoeuvres should do Brandt-Daroff exercises. The study also emphasises the importance of follow-up treatment to avoid recurrence and maintain symptom relief. The study has limitations despite these important findings. A larger cohort would have more statistical power, yet the 40-patient sample may not apply to a larger population. Since the study is retrospective, confounding variables including procedure execution, patient adherence, and preceding therapies cannot be controlled for. Since follow-up beyond three months was not included, more study is needed on longer-term recurrence rates. Larger, multi-center investigations are needed to corroborate these findings across populations. By testing different repositioning movements for different BPPV subtypes (such as horizontal or anterior canal involvement), future research may reveal the optimum treatment methods. Investigating adjunct therapies like vestibular rehabilitation exercises can help determine if combining treatments improves long-term results. This study supports canalith repositioning, especially the Epley manoeuvre, as the gold standard for BPPV treatment. Although

the Semont technique can be utilised, the Brandt-Daroff exercises are not advised as a primary treatment due to their lower efficacy and higher recurrence. These findings should help clinicians identify the optimal BPPV treatment to reduce symptoms and prevent recurrence.

Conclusion

This retrospective study compares the performance of numerous benign paroxysmal positional vertigo (BPPV) treatments. Epley manoeuvre outperformed Semont and Brandt-Daroff in symptom remission (88.9%) and recurrence (11.1%). The Semont technique also worked well, with 75% resolution and 25% recurrence.

However, Brandt-Daroff exercises were the least effective, with half of patients reporting full symptom relief and 40% recurring. Epley technique has a lower recurrence rate and higher success rate than other posterior canal BPPV treatments, hence it should be the first-line treatment. If the Epley manoeuvre is impossible, the Semont manoeuvre may be employed. Only in extreme cases when other approaches have failed can Brandt-Daroff exercises be used to aid patients who cannot reposition. Prioritising evidence-based BPPV treatment can improve patient outcomes, including quick symptom alleviation and lower recurrence risk. This study's findings and treatment's long-term consequences require prospective research.

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