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Original Research Article

Efficacy of Epley's Maneuver in Benign Paroxysmal Positional Vertigo (BPPV)

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Abstract: *Vertigo is among the most common complaints in patients visiting ENT outpatient departments (OPD), especially among the elderly, where it significantly increases the risk of falls. One of the leading causes of neurological vertigo is Benign Paroxysmal Positional Vertigo (BPPV), a vestibular disorder that, although self-limiting, can cause recurrent episodes and impair quality of life, particularly with advancing age. Epley's maneuver is a noninvasive, cost-effective repositioning technique designed to treat posterior canal BPPV by relocating canaliths from the semicircular canal to the utricle.* ***Objective:*** *To evaluate the effectiveness of Epley's maneuver in patients diagnosed with posterior canal BPPV.* ***Methods:*** *This prospective observational study was conducted at the ENT Outpatient Department of PNS SHIFA Hospital, Karachi from January 2023 to December 2023. A total of 90 patients diagnosed with posterior canal BPPV were enrolled using non-probability convenience sampling, with the sample size based on previous studies. Participants were randomized into three equal groups (n=30): Group A received only medical therapy, Group B underwent Epley's maneuver alone, and Group C received both Epley's maneuver and medical treatment. Follow-up assessments were conducted at the 2nd and 4th weeks to evaluate symptom resolution and improvement in quality of life. Statistical analysis was performed using SPSS v25. Chi-square and ANOVA tests were applied, with a p-value <0.05 considered significant.* ***Results:*** *Patients treated with Epley's maneuver (Groups B and C) showed significantly greater symptomatic relief at both the 2nd and 4th-week follow-ups compared to those receiving only medical management (Group A). The combination of Epley's maneuver with medication (Group C) yielded the highest rates of symptom resolution. Quality-of-life scores and functional assessments showed marked improvement in the maneuver groups compared to the medicine-only group (p<0.05).* ***Conclusion:*** *Epley's maneuver is an effective, non-invasive intervention for managing posterior canal BPPV. When combined with medical therapy, it enhances treatment outcomes and significantly improves patient quality of life compared to medical management alone.*

Keywords: Benign Paroxysmal Positional Vertigo, Epley's Maneuver, Neurological vertigo

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Introduction

Benign paroxysmal positioning vertigo is a disorder of the vestibular system, which is the part of the inner ear and brain that help control balance and movement of eye. It is also characterized by transient rotatory vertigo attacks and has strong association with nystagmus. (1) It is a commonly occurring vestibular disorder that leads to multiple recurrent episodes of vertigo (a feeling of head spinning). The estimation of incidence of this disease is difficult because of the benign nature, that is, self-limited disease. It is thought to range from 10.7 per 100,000 to 17.3 per 100,000 population in Japan (2) and has been reported as 64 per 100,000 in a population study from Minnesota. (3) Although benign paroxysmal positional vertigo can affect individuals of any age, it is more common in older people over the age of 60 (4) Dizziness or vertigo has a prevalence rate of around 28-30% (5) out of which the prevalence of only BPPV is 2.4% with the higher rate in females than male. The female to male ratio is 3:1. (6) Mostly no specific etiological factors of BPPV can be recognized. While the most frequently identified cause was closed head trauma, which further comply with vestibular neuritis. 15% of the patients suffering from vestibular neuritis will develop BPPV. Some more known predisposing factors are some of the surgical methods, like stapedectomy and cochlear implant procedure, and various infections (6) Some researchers believe that Meniere's disease and longer duration of bed rest also are predispose to BPPV. (7) While in majority, 93% of the cases the posterior semicircular canal was found affected, unilateral being 85% and 8% bilaterally affecting the PSC. Anterior canal is rarely affected in this disease while horizontal semicircular canal was affected in 5% of cases. (4) The pathophysiology of this disease is the dispossession of micro-sized calcium crystals (otoconia) from the actual location, into semi-circular canal of any one of the Ear. As the head position change with respect to gravity (for example, while gazing upward or down, sudden roll over on bed, head injury or head tilting), otoconia move on the trigger, which causes dislocation of semi-circular canal fluid, prompting the vibe of vertigo or dizziness. (8, 9) The bedside procedure known as Dix-Hall pike test when coordinated with an appropriate history is foundation in constructing the diagnosis. (5) Epley's maneuver has been suggested as the most effective canalith repositioning procedure, especially for treating PC-BPPV (posterior canal Benign Paroxysmal Positional Vertigo). The crystals are transported back to the utricle through a sequence of head motions, where the endolymphatic sac either absorbs them or removes them. (10) Even with simple repositioning procedures, certain research indicate that an identifiable recurrence rate persists after a year. (11) This study aims to compare the effectiveness of the EM as treatment option for BPPV of posterior canal versus medication and to differentiate the long-term and short-term resolution of BPPV. The major expected outcome is freedom from vertigo while measuring it through Dix-Hall pike test, which must be negative when checked even after 01 month of treatment.

Methodology

This prospective observational study was conducted over a period of one year, from January 2023 to December 2023, at the Department of ENT, PNS Shifa Hospital, Karachi. A total of 90 participants who tested positive on the Dix-Hallpike test were included in the study. These participants were randomly allocated into three groups using a simple random sampling technique in a single-blinded manner. Group A received only medicinal therapy, Group B was treated exclusively with Epley's maneuver, which was repeated as needed until symptom resolution, and Group C received a combination of both medication and Epley's maneuver.

The sample size was determined based on findings from previous studies to ensure adequate statistical power. The inclusion criteria encompassed clinically diagnosed cases of posterior semicircular canal benign paroxysmal positional vertigo (BPPV) in patients aged 15 to 60 years, of either gender, who provided informed consent. Individuals were excluded if they had a history of ear diseases such as chronic suppurative otitis media or tympanic membrane perforation, cervical spondylosis, or comorbidities including diabetes, hypertension, or any known nutritional deficiencies.

Informed consent was obtained from patients who visited the OPD. The investigator filled the Subject Evaluation Form, and 90 study participants were enrolled in a positive Dix-Hall pike test. These participants were divided into three major groups of 30 patients each, receiving only medical therapy, only Epley's maneuver and both. Epley's maneuver was repeated until the participants' symptoms resolved. The results were categorized after treatment with and without Epley's maneuver into symptomatic improvement or not. In Epley's maneuver, to evoke vertigo, the head is placed in the Dix-Hall pike position. The posterior canal on the affected side of the ear is in the vertical plane of the earth, with the head in this position. As soon as the initial nystagmus subsided, a 180-degree turn of the head to the position in which the affected ear was up was performed. The patient was then brought to the sitting upright position. The maneuver was repeated until no more nystagmus was elicited. The medicinal therapy administered orally to the patients was betahistine 16 mg twice daily for 2 weeks and prochlorperazine 5 mg thrice daily for 5 days. The patients were followed up for four weeks with re-visits at the 2nd week & 4th week. The follow-up

process was explained to the patients and they followed up throughout this period. The identification forms were separated from the data collection instruments and kept under lock.

Statistical software SPSS version 23.0 is used. Demographical data of ages and gender was analyzed to exclude confounding effects of main outcome variables. Data of past history of vertigo was also similarly assessed. Main outcome was the comparison of Epley's group and medication group. This was performed by applying chi-square test and p value of 0.05 was set as standard (less than 0.05 to be considered as statistically significant). Data at 2 weeks and 4 weeks followup was separately analyzed. Secondary outcome comparisons were the comparison of other groups by same chi-square tests.

Results

A total of 90 patients with a clinical diagnosis of benign paroxysmal positional vertigo (BPPV) participated in the study. The mean age of participants was 37.52 years (standard deviation 11.08), ranging from 17 to 60 years. As for as gender distribution is concerned there were 36(40%) females and 54(60%) males. The difference of gender distribution as well as means of ages in three treatment groups were not statistically significantly (p value 0.164 and 0.250 respectively) to affect the results of main outcome variables.

Total 10 patients had past history of vertigo and difference of distribution of these 10 patients in three treatment groups was not statistically different, hence this variable is not affecting main outcome variable.

A comparative analysis was performed to evaluate the effectiveness of Epley's maneuver versus medication alone in the treatment of benign paroxysmal positional vertigo (BPPV). At the 2-week follow-up, 67.6% of patients in the Epley's maneuver group experienced complete resolution of symptoms, compared to only 32.4% in the medication group. This difference was statistically significant, with a chi-square p-value of 0.002, indicating that the Epley's maneuver was significantly more effective than medication alone in achieving symptom resolution at 2 weeks (Table 1). At the 4-week follow-up, a continued advantage was observed in the Epley's group, with the chi-square test yielding a p-value of 0.038, again demonstrating a statistically significant difference in favor of the maneuver over medication alone (Table 2).

Further analysis was conducted to compare the effectiveness of Epley's maneuver alone versus a combination of Epley's maneuver and medication. At both the 2-week and 4-week follow-ups, no statistically significant differences were observed between the two groups, with p-values of 0.405 and 0.228, respectively. This suggests that the addition of medication did not provide any added benefit over the maneuver alone. Similarly, when comparing the medication-only group with the group receiving both Epley's maneuver and medication, no significant differences in symptom resolution were observed at either time point, as reflected in the respective p-values presented in Table 1 and Table 2. These findings highlight the superior efficacy of Epley's maneuver over medication and suggest that its combination with pharmacological therapy does not confer additional benefit..

Table 1: Crosstabulation and p values at 2 weeks follow up

Vertigo at 2 weeks	Primary comparison		Secondary comparison		Secondary comparison	
	Epley's (Group B)	Medication (Group A)	Epley's (Group B)	Medication plus Epley's (Group C)	Medication (Group A)	Medication plus Epley's (Group C)
Imporoved	23	11	22	19	11	19
Not improved	7	19	8	11	19	11
P value	0.002		0.405		0.039	

Table 2: Crosstabulation and p values at 4 weeks follow up

Vertigo at 4 weeks	Primary comparison		Secondary comparison		Secondary comparison	
	Epley's (Group B)	Medication (Group A)	Epley's (Group B)	Medication plus Epley's (Group C)	Medication (Group A)	Medication plus Epley's (Group C)
Imporoved	28	22	28	25	22	25
Not improved	2	8	2	5	8	5
P value	0.038		0.228		0.347	

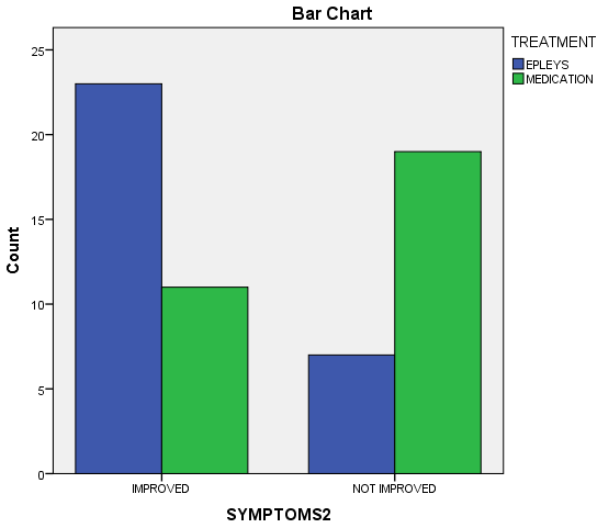

Figure 1. Bar chart for comparison of Epley's group to Medication group at 2 weeks followup

Discussion

Clinical diagnosis is made for benign paroxysmal positional vertigo, which typically affects older adults. (4) In line with previous research, the participants in our study ranged in age from 17 to 60 years old, with a mean age of 37.52 years and a standard deviation of 11.08. (12) There appears to be a preference for women based on the gender distribution. In this research, among the respondents there were 36(40%) females and 54(60%) males; this contradicts to other reported findings (3).

Up to 67.6% of patients in the current trial reported feeling better following the initial two-week follow-up period. Ninety percent of patients in randomized research were either cured or improved following just one Epley technique session. (13)

After just one treatment session, Epley himself recorded a success rate of over 90%. Twenty-eight patients (93%) recovered from vertigo at the fourth week of follow-up, whereas 23 patients (76%) recovered at the two-week mark following the Epley maneuver. The other two cases, however, showed no improvement at all. In contrast, 11 (36%) of the 30 patients in Group A recovered from vertigo at the first follow-up, and 22 (73%) did so at the second. 19 (63%) and 25 (83%) of the patients in Group C, which received Epley and medicine together, showed improvement in the first and second follow-ups, respectively. According to these statistics, the Epley technique is the most successful treatment method for BPPV. Betahistine, a labyrinthine sedative, was unable to reduce BPPV symptoms. Even after extended usage, labyrinthine sedatives (Betahistine) were unable to manage the symptoms of BPPV, however some patients may experience only slight improvement. (4) According to our research, Epley's maneuver alone is a more successful and efficient way to manage BPPV than medicine alone (group B's efficacy was 67.6% compared to group A's 32.4%). Therefore, by using a safe, easy, and efficient method that may prevent needless laboratory testing, extensive extra testing, and longer-term temporary incapacity, this move improves the quality of life for individuals with BPPV. According to our research, Epley's maneuver alone is a more successful and efficient way to manage BPPV than medicine alone (group B's efficacy was 67.6% compared to group A's 32.4%).

Using a critical review of the medical literature, Prim-Espada et al. conducted a meta-analysis on the effectiveness of Epley's maneuver in benign paroxysmal positional vertigo and found that patients who underwent the procedure had a six-and-a-half-fold higher chance of experiencing a reduction in their clinical symptoms than the control group (OR = 6.52; 95% CI, 4.17–10.20). (14)

In a study of 62 patients, Khatri et al. evaluated the effectiveness of Epley's procedure in the treatment of BPPV. Patients were chosen on the basis of positive Dix-Hallpike's test results and positional vertigo symptoms. After a month, patients were evaluated objectively using the Dix-Hallpike positioning test and subjectively using the visual analogue scale (VAS). In both groups, 85.7% of patients reported that their BPPV symptoms had completely resolved on the VAS. After one month of treatment, 88.2% of the first group objectively did not experience positional nystagmus, whereas 86% of the second group experienced full response (15). The foregoing findings were corroborated by the thorough literature analysis; for example, a Brazilian study found results that were comparable to ours. (16)

The Semont maneuver was used to treat 412 patients with unilateral benign paroxysmal positional vertigo of the posterior semicircular canal. If the patients' symptoms did not improve, three Epley maneuvers and Brandt-Daroff exercises were administered in succession. According to the study, 98% of patients with unilateral benign paroxysmal positional vertigo of the posterior semicircular canal were treated by the aforementioned treatment protocol (17). Liberatory maneuver-betahistine and Brandt-Daroff-betahistine groups outperformed liberatory maneuver and Brandt and Daroff groups in prospective research ($p < 0.05$). This study shows that betahistine combined with particle repositioning maneuvers is more effective in curing BPPV (18).

Conclusion

The findings of this study demonstrate the high efficacy of Epley's maneuver in resolving vertigo symptoms in patients with BPPV. The results suggest that Epley's maneuver should be considered a first-line treatment for such patients in clinical practice.

Declarations

Data Availability statement

All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department concerned. (IRBEC-PNS -0331-22)

Consent for publication

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The authors declared the absence of a conflict of interest.

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All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.

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