ORIGINAL ARTICLE

# Comparison of the Effects of Betahistine Dihydrochloride and Brandt-Daroff Exercises in Addition to Epley Maneuver in the Treatment of Benign Paroxysmal Positional Vertigo

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**Objective:** Our purpose in this study was to compare the efficiencies of Epley maneuver, Brandt-Daroff exercises and medical therapy protocols using betahistine dihydrochloride in patients with benign paroxysmal positional vertigo.

**Materials and Methods:** This study included sixty patients who admitted with dizziness and were diagnosed as posterior canal benign paroxysmal positional vertigo after a positive Dix-Hallpike test. These patients were divided randomly into three groups; one group received only the Epley maneuver (Epley group), the second group had Brandt-Daroff home exercises besides the Epley maneuver (exercise group) and last group was given a prescription of betahistine dihydrochloride, 24 mg orally twice daily in addition to the Epley maneuver (medical treatment group). Patients in each group were called in for a control examination a week apart for three times and on the third month, 6$^{th}$ month and 12$^{th}$ month thereafter. In the control examinations, persistence or recurrence of the disease was evaluated by performing the Dix-Hallpike maneuver. In patients with a positive test, the Epley maneuver was done and additional treatment was continued, if any following the Epley maneuver, each patient was evaluated by a dizziness disability survey that was performed in the first controls and a search was conducted on how treatments changed their daily qualities of life.

**Results:** A complete cure was detected by a negative Dix-Hallpike test in 45 (75%) of the patients at the first week control after the first maneuver, which was considered successful. A second maneuver was applied to 4 patients (20%) (one of these patients received the maneuver three times) in the medical treatment group while 6 patients (30%) in the exercise group and 5 patients (25%) in the Epley group had a second maneuver.

**Conclusion:** We concluded that no change in the success of treatment was observed when the Epley maneuver was combined with other procedures. No significant difference was found between the groups. Applying only the Epley maneuver in patients with benign paroxysmal positional vertigo seems sufficient for obtaining a cure. On the other hand, medical treatment can be useful in nausea and vomiting that may occur during the treatment while it can be also used to treat dizziness that may continue after the treatment.

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## Introduction

Benign paroxysmal positional vertigo (BPPV) is a common disease in society, hence, frequently encountered particularly in ENT and neurology clinics, and its symptoms are very distressing for the patient. Despite this, BPPV is a disease that is simple to diagnose and treat.[1-4]

Physical maneuvers developed in recent years and are mostly applied in a single session have become very popular in the treatment of this disease. The most frequently used one of these is the Epley maneuver[5]. Still, because there is no consensus in the world on single method in treatment protocols, the superiorities of these methodologies to each other are not totally known.

In addition, investigating the prognostic factors for the disease, the etiologic causes in its recurrence, new approaches to increase the success rate of treatment, or how useful it would be to combine different procedures would prove beneficial in establishing diagnosis more easily and achieving positive outcomes.

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Looking at the literature, the effectiveness of the Epley maneuver has been generally investigated on its own or in comparison with the other methods. In our study, however, we have applied the Epley maneuver on all the patients in an attempt to understand its differences to its combination with other methods as well as the impacts of these differences on the treatment and to what extent they change the quality of life for the patient.

## Materials and Methods

After obtaining the local ethics committee approval of the Haydarpasa Training and Research Hospital (Protocol No. 90-40), this study was conducted with patients who were diagnosed with posterior channel BPPV upon positive responses to the Dix-Hallpike test from among the patients who presented with complaints of dizziness to the Fatih Sultan Mehmet Training and Research Hospital ENT outpatient clinic between October 2006-April 2010. Patients diagnosed with bilateral BPPV were excluded from the study.

In the detailed ENT examination performed on all the patients, especially the auricle, external ear canal, and tympanic membrane were evaluated carefully to determine acute or chronic pathological findings and those patients with an identified pathology were not included in the study. Patients with vestibular system disorders other than BPPV, such as chronic otitis media, perilymph fistula, labyrinthitis and vestibular neuritis, or with central pathologies were excluded from the study. In addition, patients with cervical and lumbar pathologies that prevent them from doing the Epley maneuver or those patients who did not want to undergo the Epley maneuver following Dix-Hallpike maneuver were also excluded.

History of a systemic disease, ongoing drug use or termination of drug use or history of trauma were investigated. Those patients with a history of neurological or systemic disease as well as those who have used vestibulo-suppressant drugs in the anamnesis were excluded from the study.

Possible complications were explained to the patients who wanted to participate in the research and their informed written consent was obtained.

Patients diagnosed with BPPV and received Epley maneuver were completely randomized into three groups. Only the Epley maneuver was applied on the first group of patients and they were told to refrain from sudden movements (bending down, reaching up, to avoid jobs that require heavy exertion, sudden left or right turns, etc.). To the second group, in addition to the Epley maneuver, the Brand-Daroff exercises they will do at home were explained in the form of written and schematized explanations and they were told to repeat the exercises five times, thrice a day6. Oral tablet with betahistine dihydrochloride 24 mg molecule content was prescribed b.i.d. to the third group of patients, in addition to the Epley maneuver. Patients in each group were called in for a control examination a week apart for three times and on the 3rd month, 6th month and 12th month thereafter. In the control examinations, persistence or recurrence of the disease was evaluated by performing the Dix-Hallpike maneuver. In patients with a positive test result, the Epley maneuver was repeated and additional treatment was continued, if any. Following the Epley maneuver, each patient was evaluated by a dizziness disability survey that was performed in the first controls and a search was conducted on how treatments changed their daily qualities of life[7]. (Table 1)

In the evaluation of findings of the study, SPSS (Statistical Package for Social Sciences) for Windows 11.5 software was used for statistical analysis. For evaluating the study data, descriptive statistical methods (mean, standard deviation) as well as the Pearson and Kruskal-Wallis chi-square tests were used in inter-group comparisons of quantitative parameters showing normal distribution to compare the data. In addition, evaluations between groups were performed with Spearman's correlation test. The results were considered to be in the 95% confidence interval and significance as $p<0.05$.

*Epley maneuver*

The patient is seated with the head turned approximately 45 degrees towards the affected side and lied backward quite quickly with the neck is extended approximately 30 degrees over the edge of the bed. Dizziness or nystagmus is monitored and the patient remains in this position until any possible symptoms disappear. While the head is still in the 30 degree extended position, it is turned approximately 45 degrees towards the other side. Waiting for a minute in

**Table 1.** Dizziness disability survey

The following questions search out how dizziness affects an individual's life. Please specify how dizziness affects your life using answers from 0 to 4 appropriately.

| | | | | | |
|---|---|---|---|---|---|
| Dizziness restricts me socially | 0 | 1 | 2 | 3 | 4 |
| I can spare my leisure time for various activities (eg. sports, entertainment) | 0 | 1 | 2 | 3 | 4 |
| When I have dizziness, people around me starts feeling uneasy | 0 | 1 | 2 | 3 | 4 |
| I can wander around easily | 0 | 1 | 2 | 3 | 4 |
| I have less self confidence compared to the past | 0 | 1 | 2 | 3 | 4 |
| I feel uneasy to go out by myself | 0 | 1 | 2 | 3 | 4 |
| Dizziness restricts my family life | 0 | 1 | 2 | 3 | 4 |
| Even less activity demanding hobbies seem difficult to me (such as reading or sewing) | 0 | 1 | 2 | 3 | 4 |
| I can ride vehicles even though I have dizziness. | 0 | 1 | 2 | 3 | 4 |
| I do not avoid bending down as much as possible | 0 | 1 | 2 | 3 | 4 |
| My family arranges my life style in keeping with my dizziness. | 0 | 1 | 2 | 3 | 4 |
| My friends do not know how to react to my illness and they fail to understand it. | 0 | 1 | 2 | 3 | 4 |
| I think that I have a serious problem | 0 | 1 | 2 | 3 | 4 |
| People are considerate towards the problems resulting from dizziness | 0 | 1 | 2 | 3 | 4 |
| I am anxious about experiencing an unexpected dizziness attack | 0 | 1 | 2 | 3 | 4 |
| I can keep on doing my work during a dizziness attack | 0 | 1 | 2 | 3 | 4 |
| I find these attacks scary | 0 | 1 | 2 | 3 | 4 |
| Dizziness worries me | 0 | 1 | 2 | 3 | 4 |
| I avoid making plans for the future | 0 | 1 | 2 | 3 | 4 |
| I can do my daily activities without any difficulty (shopping, housekeeping, garden works etc.) | 0 | 1 | 2 | 3 | 4 |
| I am afraid of interfering other peoples' activities because of my illness. | 0 | 1 | 2 | 3 | 4 |
| I am rather depressed because of dizziness (I am demoralized) | 0 | 1 | 2 | 3 | 4 |
| During a dizziness attack, I feel relieved when I sit down | 0 | 1 | 2 | 3 | 4 |
| I am ashamed when I experience a dizziness attack in the presence of other people. | 0 | 1 | 2 | 3 | 4 |

*0- Never* *1-Seldom (1-3 times a year)* *2- Sometimes (4-12 times a year)*
*3-Often (more than once a moth)* *4- Very often (more than once a week)*

between these positions, or if dizziness or nystagmus occurs, until they disappear is necessary. Then the patient is told to turn towards the top of the shoulder on the unaffected side. While the patient turns, the physician turns the head of the patient 90 degrees to the opposite direction and the patient remains in this position for another minute. The patient is then brought to the seated position and the head is bend down forward 20 degrees and remains in this position for one minute and the maneuver is concluded as such[5].

*Brandt-Daroff Exercises*

While the patient is in the sitting position, the patient moves into the lying position on the affected side on the shoulder, with the head angled upward with about 45 degrees. The patient stays in this for 30 seconds and then goes back to the sitting position, looks forward, and remains in this position for 30 seconds as well. The patient repeats the same procedure for the other side, too6. The patient performs this maneuver 5-10 times, thrice a day. The exercise is repeated on two consecutive days, until dizziness disappears.

## Results

Thirty-six (60%) of the 60 patients included in the study were females while 24 (40%) were males. Only the Epley maneuver was applied on 20 out of these 60 patients (Epley Group). 20 patients were given Brandt-Daroff home exercises in addition to the Epley maneuver (Exercise Group). Finally, the Epley maneuver was applied to 20 patients and Betahistine dihydrochloride 24 mg oral tablet with was prescribed as 2x1 (Medication Group).

The ages of the patients ranged between 31 and 79 and the mean age was 48.18. The mean age of the Medication Group was 46.8, that of the Exercise Group was 47.9 and of the Epley Group, it was 51.8. There was no statistically significant difference between the age groups ($p>0.005$).

Disease durations varied between a minimum of three days and a maximum of seven years in the entire patient groups. Number of patients who had the complaints for less than one month was 15 (25%), between one month and six days was 31 (51.6) and more than six months was 14 (23.3%). There was no statistically significant difference among the groups in terms of durations of disease (Kruskal-Wallis statistical evaluation, p>0.005).

Right BPPV was detected in 39 (65%) of the patients while left-side BPPV was diagnosed in 21 (35%) of the patients. There was no statistically significant difference between the groups in terms of affected sides (p>0.005). Patients diagnosed with bilateral BPPV were excluded from the study.

Cure was detected by a negative Dix-Hallpike test at the first-week control after the first maneuver in 45 (75%) of the patients and this result was considered as success. Nystagmus and vertigo were noticed in 15 (25%) of the patients and a second maneuver was applied to these patients. Of these patients, only 1 (1.6%) required a third maneuver to be applied. Nine of the patients who received a second maneuver were females and 6 were males. This ratio was consistent with the general female/male ratio in the overall number of the cases. A second maneuver was applied to 4 patients (20%) in the Medication Group (one of these patients required the maneuver thrice), to 6 patients (30%) in the Exercise Group and to 5 (25%) patients in the Epley Group. When number of maneuvers applied is considered, there was no significant difference among these groups in the statistical comparison (p>0.005). However, the average age of the patients who received the second maneuver was significantly higher than the overall average age (p<0.005).

Thus, the success rate was calculated as 75% and 98.3% after the first and second maneuvers, respectively.

The number of patients who had recurrence was 10 (16.6%) after the 12th month. Seven (70%) out of these patients were older than 40. Three of these patients (33.3%) belonged to the Medication Group, four (40%) belonged to the Exercise Group, and three (33.3%) belonged to the Epley Group. This distribution was insignificant according to the Pearson chi-square statistical evaluation (p>0.005). This shows that there is not any significant difference among these three treatment protocols in terms of recurrence rates.

In the Spearman correlation evaluation in which all the three groups are compared, there is no significant difference among the groups in terms of age, gender, duration of complaints, trauma rate, number of maneuvers and recurrence rate (r<0.3).

The quality of life after the treatment was investigated with a dizziness disability survey that was performed in the last control that is considered cure (Table 1). While no statistically significant difference was observed among the groups as for most of the parameters that were asked to the patients in this survey (p>0.005), especially those about daily activities (doing sports, entertainment etc.) self confidence and riding vehicles, data from the Medication Group were more rewarding compared to the Exercise Group as well as the Epley Group (p>0.005).

## Discussion

Schuknecht developed the cupulolithiasis theory in studies concerning pathogenesis of this disorder in 1963[8]. However later on, Epley claimed that BPPV was a result of canalolithiasis and he developed the maneuver named after him[5].

Trauma[9], labyrinthitis[10], Meniere's disease, stapes surgery, female gender, advanced age, and osteoporosis are among the factors that are held responsible as causes of BPPV[1,4,10]. History of previous trauma was evident in 8 (13.3%) of our patients. Several authors developed various techniques and therapy protocols to be used in the treatment of BPPV. For example Semont described the Semont menuver[11] that he developed for cupulolithiasis, Cawthorn developed the rehabilitation therapy[3] known as "habituation training" in order to accelerate central compensation and with a similar intention, Brandt and Daroff described home exercise programs named after their names and that every patient could do at home[6].

The relevance of medical treatment in BPPV is controversial. Betahistin dihydrochloride, which has a mechanism of action based on interactions with H1 and H2 receptors, is being used in the treatment of vertigo. This molecule acts through inhibition of

activation in vestibular nuclei, diminishing the resting flow of ampullary hair cells in the labyrinth and increasing cochlear blood flow[12]. Hence, various studies are focused on this matter.

Cavaliere compared the Liberatory and Brandt-Daroff procedures on their own and with Betahistin and in the short term, he achieved a higher success in the Betahistin group. However, achievement of complete cure in all the groups at the end of three months suggests that BPPV recovers spontaneously[13]. However, there is controversy on whether the consideration of subjective criteria obtained from patients as an indication for success in this study is beneficial, especially for the basic mechanism of the disease or for the imbalance period that follows.

In a study Magliulo et al. have reported balance weakness and objective vertigo in %27.1 of the patients despite the 75% and 100% success rates in the first and second maneuvers, respectively. It was to such an extent that 22% of the patients were afraid of getting out of their homes without companion, 25% complained of restriction in the quality of social life, and 29% complained of difficulties at work[14].

In a study of post-treatment dizziness, Seok described a particular feeling of lightheadedness and staggering in 61% of the patients after reposition15. As we observed in the patients of our study group, medical treatment enhances self esteem in people who especially perform critical works such as driving constantly. We also noticed in our dizziness disability survey which we performed despite we had no objective findings in our last control (i.e. that we considered cure), that patients had difficulty in carrying out daily activities, were particularly afraid of doing sports, and hesitated riding vehicles. These complaints were less common in the Medication Group. However, it must be remembered that this difference might arise from the placebo effect of the drug as well.

The female gender rate was 60% and the proportion of the patients older than 50 was 48.18% in our study and these were parallel to other studies. Besides, our recurrence rate was 16.6% during the long term (12 months in our study) follow up. However, there was no difference in terms of the recurrence rate among the patient groups. Seventy per cent of our patients who suffered relapse were older than 40.

Considering pathogenesis, it was a matter of curiosity whether restriction of body movements would change the treatment modality. Cakir et al. divided patients into two groups and gave one group neck support for two days and restriction of movement after the Epley maneuver and they applied only the Epley maneuver to other group. They found that the number of patients who required the maneuver thrice was higher in the second group[16]. Casquerio et al. divided their patients into two groups and had the first group wear neck support for two days after the Epley maneuver and prohibited them from lying down on the affected side for ten days. They applied only the Epley maneuver to the second group. They did not find any differences in patients who underwent postural restriction in terms of the number of maneuvers and recurrence rate. The recovery rate after the first maneuver was 76.5% for all the patients in the same study[17]. We recommended the Epley Group only to avoid sudden head and body movements; however, did not make them use neck support. Our success rate after the first maneuver was 75% while we had a recovery rate of 98.3% after the second maneuver and this result was consistent with the literature.

In their study, Helminski et al. gave the Brandt-Daroff home exercises four times a day for a week to some of the patients with BPPV, whom they treated successfully using the Epley maneuver, while the other group did not receive any treatment. They questioned dizziness and checked for recurrence by performing the Dix-Hallpike in a clinical setting to the patients who could come once in two months, they made phone calls to those who could not come for controls and inquired them about dizziness and recurrence. Patients who developed symptoms earlier than two months period were asked to come immediately. As their study results indicated, they did not find any significant difference in terms of recurrence rates and frequencies between the two groups. However, the recurrence rates were found higher in patients with a previous BPPV history[18]. In our follow-ups, we did not detect any difference in terms of cure percentage and recurrence rates. For this reason, we believe that for patients who can come over for control and whom we can examine by the Dix-Hallpike maneuver and apply the maneuver once more if necessary, there is no need for exercises that can lead to distress in their daily lives.

## Conclusion

Benign paroxysmal positional vertigo (BPPV) is a common disease in society, hence, frequently encountered particularly in ENT and neurology clinics; its symptoms are very distressing for the patient and it can extremely deteriorate the quality of life; however, despite these facts, it is an easily diagnosed and treated cause of vertigo. We have investigated whether a change in treatment success occurs when the Epley maneuver is combined with the other procedures. There was no significant difference among the groups. Applying only the Epley maneuver to the patients we diagnosed to be with BPPV seems to have been sufficient for achieving a cure. However, in case of nausea and vomiting that can occur during the treatment and dizziness that can continue after the treatment, medical treatment can be of use. Also, the need for maneuver increases in patients with advanced age.

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