CLINICAL STUDY

# THE EFFECT OF REPOSITIONING MANEUVERS ON QUALITY OF LIFE, VERTIGO SYMPTOMS AND DIZZINESS IN PATIENTS WITH BENIGN PAROXYSMAL POSITIONAL VERTIGO

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**SUMMARY**

Objective: The aim of our study is to examine the effects of repositioning maneuvers applied to patients diagnosed with BPPV on quality of life, vertigo and dizziness symptoms.

Material and Method: The study was carried out with 67 patients between the ages of 18-65 who were diagnosed with BPPV. Vertigo Dizziness Imbalance Scale and Dizziness Handicap Inventory were filled by the researcher before and after the reposition maneuver.

Results: A statistically significant difference was found in the pre- and post-reposition evaluations in the symptom scale and quality of life sub-dimensions of the Vertigo Dizziness Imbalance Scale and in the physical, emotional and functional sub-dimensions of the Dizziness Handicap Inventory ($p<0.05$). After the reposition maneuver, a statistically significant difference was also observed between different BPPV diagnoses in the quality of life sub-dimension score of the Vertigo Dizziness Imbalance Scale ($p<0.05$).

Conclusion: Reposition maneuvers not only reduce the symptoms of vertigo and dizziness, but also positively affect the quality of life.

*Keywords: Benign paroxysmal positional vertigo, repositioning maneuver, quality of life, dizziness*

**BENİGN PAROKSİSMAL POZİSYONEL VERTİGOLU HASTALARDA REPOZİSYON MANEVRALARININ YAŞAM KALİTESİ, VERTİGO SEMPTOMLARI VE DİZZİNESS ÜZERİNE ETKİSİ**

**ÖZET**

Amaç: Çalışmamızın amacı, BPPV tanısı alan hastalara uygulanan repozisyon manevralarının hastaların yaşam kalitesi, baş dönmesi ve dengesizlik semptomları üzerindeki etkisini incelemektir.

Gereç ve Yöntem: Çalışma, 18-65 yaş arasında olan BPPV tanısı almış 67 hasta ile gerçekleştirilmiştir. Hastalara repozisyon manevrası öncesi ve sonrası olmak üzere Vertigo Dizziness Dengesizlik Ölçeği ve Baş Dönmesi Engellilik Envanteri araştırmacı tarafından doldurulmuştur.

Bulgular: Vertigo Dizziness Dengesizlik Ölçeği'nin semptom skalası ve yaşam kalitesi alt boyutlarında ve Baş Dönmesi Engellilik Envanteri'nin fiziksel, duygusal ve fonksiyonel alt boyutlarında repozisyon manevrası öncesi ve sonrası değerlendirmelerinde istatistiksel açıdan anlamlı farklılık bulunmuştur ($p<0.05$). Repozisyon manevrası sonrası Vertigo Dizziness Dengesizlik Ölçeği'nin yaşam kalitesi alt boyut puanında farklı BPPV tanıları arasında da istatistiksel olarak anlamlı farklılık bulunmuştur ($p<0.05$).

Sonuç: Repozisyon manevraları kişinin vertigo ve dizziness semptomlarını azaltmasının yanı sıra yaşam kalitesini de olumlu yönde etkiler.

*Anahtar Sözcükler: Benign paroksismal pozisyonel vertigo, repozisyon manevrası, yaşam kalitesi, dizziness*

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## INTRODUCTION

Vertigo is divided into two as central and peripheral. Although central vertigo is accompanied by neurological symptoms such as diplopia, dysarthria, coordination disorder, drowsiness and weakness, the symptoms are milder but last longer than peripheral vertigo. More than 90% of peripheral vertigo cases consist of benign paroxysmal positional vertigo (BPPV), acute peripheral vestibulopathy and Meniere's disease. BPPV is the most common among these diseases. BPPV is diagnosed in 17-42% of patients exhibiting symptoms of peripheral dizziness[1]. In BPPV, dizziness attacks lasting for seconds occur during the angular acceleration motions of the head, but disease is asymptomatic between the attacks. Dizziness

that occurs during attacks can be accompanied by symptoms such as imbalance, nausea and vomiting. As a result of these symptoms, the quality of life of the patient is considerably affected[2]. Although the symptoms of BPPV can resolve spontaneously, they may last for days, weeks, months or years and even recur.

When patients with positional vertigo are analyzed, it is seen that the incidence of BPPV affecting the posterior or horizontal canal is more frequent. Of the BPPV cases, about 85-90% are considered to be of posterior canal origin, while approximately 5-15% are considered to be of horizontal canal origin[3]. The incidence of BPPV subtypes in which the anterior canal and multiple canals are affected, is seen to be less than 5% of the cases[4]. When determining the affected channel in BPPV, the patient's history and the features of the nystagmus that occur during the diagnostic maneuvers also have an important place in the diagnosis[5]. While the diagnostic maneuvers of BPPV include the Dix-Hallpike and side-lying maneuvers for vertical channels and head roll maneuvers for lateral channels, the canalith repositioning maneuvers include the Epley and Semont maneuvers for vertical channels and the Barbecue and Gufoni maneuvers for lateral channels[6-8].

The aim of this clinical study is to evaluate the effect of repositioning maneuvers on quality of life, vertigo symptoms and dizziness in patients admitted to our clinic and diagnosed with BPPV.

## MATERIAL and METHODS

This study was designed as a prospective study. The study included patients who were admitted to the Faculty of Medicine, Department of Otorhinolaryngology, in a local university hospital between January 2020 and March 2020. A total of 67 patients aged 18-65 years, who underwent routine ENT examinations and diagnosed with benign paroxysmal positional vertigo (BPPV) as a result of medical history and positional tests, were included. Patients who were not previously treated with a maneuver for dizziness, had no history of ototoxic drug use and had normal hearing were included in the study. Patients with Meniere's disease, migraine-associated dizziness, vertebrobasilar insufficiency, postural hypotension, neurological or systemic disease, and traumatic BPPV were excluded from the study. Of the patients included in the study, 29 were diagnosed with posterior canal canalithiasis and 8 were diagnosed with posterior canal cupulolithiasis according to the affected side when they met the following criteria in the Dix-Hallpike maneuver with VNG: the presence of rotational nystagmus lasting less than 60 seconds in the counterclockwise direction when the right ear is downward and in the clockwise direction when the left ear is downward after a latency period of 10-15 sec; the presence of rotational nystagmus usually lasting longer than 60 sec in the counterclockwise direction when the right ear is downward and in the clockwise direction when the left ear is downward with no latency period; the development of reverse nystagmus when the patient is placed in the sitting position[9,10]. Of the patients, 14 were diagnosed with lateral canal canalithiasis and 16 were diagnosed with lateral canal cupulolithiasis according to the affected side when they met the following criteria in the Head Roll maneuver with videonystagmography: the presence of nystagmus, which is geotropic nystagmus decaying in a short time, when the right ear or left ear is downward after a latent period of 10-15 seconds; the presence of nystagmus, which is ageotropic nystagmus lasting longer than geotropic nystagmus, when the right ear or left ear is downward with no latency period; and the presence of simultaneous vertigo with nystagmus[11]. After 10-15 minutes of resting following the maneuvers, the patients filled in the Demographic Data Form, Vertigo Dizziness Imbalance Scale, Dizziness Handicap Inventory, and visual analog scale forms. After 1 week, the diagnostic positional tests were performed again with videonystagmography and the same forms were again filled by the patients whose tests were negative.

"Dizziness Handicap Inventory" (DHI) used in our study is a method used to evaluate the effectiveness of treatments in diseases affecting the vestibular system. Its Turkish validity and reliability were performed by Canbal et al. in 2016[12]. The Dizziness Disability Inventory is a 25-item scale that evaluates the quality of life in individuals with vertigo,

physically, functionally and emotionally. DHI consists of three subscales: physical (7 questions), emotional (9 questions), and functional (9 questions). The maximum score that can be obtained from the scale is 100 points. A high score indicates that dizziness has a high impact on the patient's quality of life. The other scale used in our study is the Vertigo Dizziness Imbalance Scale. Its Turkish validity and reliability were performed by Yanik et al. in 2008[13]. This scale consists of two subscales. These are the symptom scale (VDI-SS) and the quality of life scale (QOLS). The symptom scale consists of 14 items and the quality of life scale consists of 22 items. The global quality of life of the patients was evaluated numerically between 0 (best) and 10 (worst) using a visual analog scale.

Repositioning maneuvers were performed on the patients diagnosed with BPPV. The repositioning maneuvers included the Epley maneuver for those diagnosed with posterior canal canalolithiasis, the Semont maneuver for those diagnosed with posterior canal cupulolithiasis, the Barbecue maneuver for those diagnosed with lateral canal canalolithiasis, the Gufoni maneuver for those diagnosed with lateral canal cupulolithiasis, followed by the Barbecue maneuver for canalolithiasis[6].

Approval for the study was obtained from the Health Sciences Institute Non-Interventional Clinical Research Ethics Committee of a university (decision number: 2019/397, date: 26.11.2019). Consent form was obtained from all participants participating in the study.

**Statistical analysis**

The data obtained were analyzed by using the SPSS (Statistical Program in Social Sciences) version 21 software. The normality of the data was tested by the Shapiro-Wilk test[14]. The level of significance for comparison tests was determined as (p) 0.05. In the variables with two groups (gender, hearing loss, tinnitus, nausea, vomiting, and fall history), the differences between the groups for the DHI, QOLS, VDI-SS were analyzed with the Mann-Whitney U Test. In the variables with multiple groups (age and BPPV), the differences between the groups for DHI, QOLS, VDI-SS were analyzed with the Kruskal Wallis test. The scores obtained from the scales before and after the maneuvers were compared by using the Wilcoxon signed-rank test.

**RESULTS**

The distribution of patients included in the study according to demographic variables is summarized in Table 1.

Of the patients participating in the study, 50.7% (n=34) were female and 49.3% (n=33) were male. Of the patients, 35.8% (n=24) were in the 44-55 age group. It was found that of the patients, 43.3% (n=29) were diagnosed with posterior canal canalolithiasis, 19.4% (n=13) had hearing loss, 26.9% (n=18) had tinnitus, 67.2% (n=45) had nausea, 23.9% (n=16) had vomiting and 7.5% (n=5) had a history of fall (Table 1).

The results of the pre- and post-repositioning DHI, VDI-QOLS and VDI-SS scores according to BPPV diagnosis are summarized in Table 2.

In the statistical analysis of the scale scores of the patients before and after repositioning, there was no statistically significant difference between patients with different BPPV diagnoses in DHI, pre-VDI-QOLS and VDI-SS mean scores ($p>0.05$). However, a statistically significant difference was found between patients with different BPPV diagnoses in post-VDI-QOLS mean scores ($p<0.05$) (Table 2).

The results of the pre- and post-repositioning DHI, VDI-QOLS and VDI-SS scores without groups are summarized in Table 3.

In the statistical analysis carried out for the pre- and post-repositioning scale scores of the patients, there was a statistically significant difference between the mean scores of DHI and all its subscales (physical, functional and emotional) ($p<0.05$) (Table 3).

The mean pre-repositioning DHI and physical, functional, and emotional subscale scores were higher compared to the post-repositioning scores, which was statistically significant ($p<0.05$) (Table 3).

There was a statistically significant difference between the mean pre- and post-repositioning VDI-QOLS and VDI-SS scores ($p<0.05$). In both scales, the mean pre-repositioning scores were lower than the post-

repositioning scores, which was statistically significant ($p<0.05$) (Table 3).

There was a statistically significant difference between the mean pre- and post-repositioning dizziness intensity scores ($p<0.05$). The mean pre-repositioning score was higher than the mean post-repositioning score, which was statistically significant ($p<0.05$) (Table 3).

**Table 1.** Distribution of demographic variables

| Variables | | Number (n) | Percentage (%) |
|---|---|---|---|
| **Gender** | *Male* | 33 | 49.3 |
| | *Female* | 34 | 50.7 |
| **Age** | *18-30 years* | 10 | 14.9 |
| | *31-43 years* | 19 | 28.4 |
| | *44-55 years* | 24 | 35.8 |
| | *57 years and above* | 14 | 20.9 |
| **BPPV Type** | *Posterior Canal Canalolithiasis* | 29 | 43.3 |
| | *Posterior Canal Cupulalithiasis* | 8 | 11.9 |
| | *Lateral Canal Canalolithiasis* | 14 | 20.9 |
| | *Lateral Canal Cupulalithiasis* | 16 | 23.9 |
| **Hearing Loss** | *No* | 54 | 80.6 |
| | *Yes* | 13 | 19.4 |
| **Tinnitus** | *No* | 49 | 73.1 |
| | *Yes* | 18 | 26.9 |
| **Nausea** | *No* | 22 | 32.8 |
| | *Yes* | 45 | 67.2 |
| **Vomiting** | *No* | 51 | 76.1 |
| | *Yes* | 16 | 23.9 |
| **Fall History** | *No* | 62 | 92.5 |
| | *Yes* | 5 | 7.5 |

**Table 2:** Comparison of the pre- and post-repositioning scale scores according to BPPV diagnosis

| | Posterior Canal Canalolithiasis | Posterior Canal Cupulalithiasis | Lateral Canal Canalolithiasis | Lateral Canal Cupulalithiasis | p value |
|---|---|---|---|---|---|
| | *Mean ± SD* | | | | |
| **Pre- DHI** | 76,3±10,3 | 81±8,5 | 70±9,9 | 77,7±9,1 | 0,085 |
| **Post-DHI** | 9,6±7,1 | 8,2±6,2 | 12,9±11,9 | 11,1±5,9 | 0,777 |
| **Pre-VDI-QOLS** | 35,1±13,9 | 27,8±12,2 | 36,3±16,3 | 27,4±14,5 | 0,155 |
| **Post- VDI-QOLS** | 95,6±7,5 | 98,4±3,9 | 90,4±12,8 | 88,4±8,2 | 0,014* |
| **Pre- VDI-SS** | 23,2±12,4 | 16,1±5,8 | 23,6±15,9 | 18,4±8,6 | 0,315 |
| **Post- VDI-SS** | 65,7±3,8 | 66,8±3,2 | 66,3±3,2 | 63,8±6,4 | 0,706 |

*p<0.05. DHI = Dizziness Handicap Inventory, VDI = Vertigo Dizziness Imbalance Scale, QOL = Quality of Life Scale, SS= Symptom Scale, VAS= Visual Analog Scale

**Table 3:** Comparison of pre- and post-repositioning scale scores

| Measurement Variables | Mean | SD | Lowest | Highest | Median | p value |
|---|---|---|---|---|---|---|
| **Pre-DHI** | 75.88 | 10.144 | 52 | 96 | 76.00 | 0.001* |
| **Post-DHI** | 10.46 | 7.968 | 0 | 46 | 10.00 | |
| **Pre-DHI Physical** | 25.58 | 2.797 | 16 | 28 | 26.00 | 0.001* |
| **Post-DHI Physical** | 3.69 | 2.950 | 0 | 12 | 4.00 | |
| **Pre-DHI Functional** | 32.00 | 3.303 | 22 | 36 | 32.00 | 0.001* |
| **Post-DHI Functional** | 3.94 | 3.171 | 0 | 14 | 4.00 | |
| **Pre-DHI Emotional** | 18.30 | 6.617 | 6 | 32 | 18.00 | 0.001* |
| **Post-DHI Emotional** | 2.84 | 3.306 | 0 | 20 | 2.00 | |
| **Pre-VDI-QOLS** | 32.64 | 14.584 | 5 | 71 | 29.00 | 0.001* |
| **Post-VDI-QOLS** | 93.10 | 9.249 | 57 | 108 | 95.00 | |
| **Pre-VDI-SS** | 21.30 | 11.981 | 2 | 56 | 19.00 | 0.001* |
| **Post-VDI-SS** | 65.48 | 4.446 | 51 | 70 | 66.00 | |
| **Pre-VAS Score** | 8.52 | 1.700 | 4 | 10 | 9 | 0.001* |
| **Post-VAS Score** | 1.06 | 0.903 | 0 | 4 | 1 | |

*p<0.05. DHI = Dizziness Handicap Inventory, VDI = Vertigo Dizziness Imbalance Scale, QOL = Quality of Life Scale, SS= Symptom Scale, VAS= Visual Analog Scale

## DISCUSSION

Although the ages of the patients included in our study ranged between 18-65, it was found that a significant portion of the patients was in the 44-55 age range (35.8%, n=24)[15,16]. In line with the literature, it was found that the incidence of BPPV in our study increased with increasing age[17]. Given the gender distribution of patients, there was no statistically significant difference between the two genders. Although results similar to our study have been reported in the literature, some

studies have reported that BPPV is more common among women than in men[15,17-19]. Considering the symptoms of the patients, the presence of nausea in 67.2% (n=45), vomiting in 23.9% (n=16), and history of fall in 7.5% (n=5) of the patients show similar rates with the studies in the literature[20-22]. These symptoms arising when the vestibular system is affected are evaluated as the results of BPPV.

In accordance with the literature, the diagnosis was determined to be posterior canal canalolithiasis in 43.3% (n=29) of the patients diagnosed with BPPV in our study[4]. The highest incidence of BPPV in the posterior canal is due to its anatomical position. In addition to the posterior canal canalolithiasis group, 11.9% (n=8) of the cases were diagnosed with posterior canal cupulolithiasis, 20.9% (n=14) with lateral canal canalolithiasis, and 23.9% (n=16) with lateral canal cupulolithiasis. The rate of diagnosis of lateral canal pathologies (canalolithiasis/cupulolithiasis) is found to be very low in some studies in the literature[23,24], while in some studies, the rate of diagnosis of lateral canal pathologies (canalolithiasis/cupulolithiasis) is found to be much higher, as in our study. These high rates are believed to be associated with the use of the VNG for the diagnosis of BPPV in recent years. The use of VNG prevents missing lateral canal pathologies. Thus, higher rates of diagnosis are achieved compared to previous years[4,5,25]. The incidence of hearing loss in 19.4% (n=13) and tinnitus in 26.9% (n=18) of the patients in our study is consistent with the studies in the literature. However, these symptoms are considered not to be directly associated with BPPV[26].

In our study, no statistically significant difference was found in the pre and post DHI, pre VDI-QOLS, pre and post VDI-SS scores in patients with posterior canalolithiasis, posterior cupulolithiasis, lateral canalolithiasis and lateral cupulolithiasis. This is an indication of having similar scores in all four BPPV cases. In line with the literature, it was found in our study that there was a statistically significant decrease in the post-repositioning scores of DHI and all subscales of the scale (physical, functional and emotional[26,27]. It is thought that the considerable reduction in the negative feelings of individuals is caused by the efficacy of the repositioning maneuvers on the BPPV pathology[9].

In our study, there was a statistically significant decrease in the post-repositioning dizziness intensity (VAS) scores. When the literature is reviewed, the statistically significant decrease in the VAS scores in various studies including BPPV patients diagnosed with posterior canal canalolithiasis[29], patients diagnosed with BPPV[26] and patients with subjective BPPV is similar to our study.

The patients in our study got the highest scores from the functional, emotional and physical subscales of the DIH before and after repositioning maneuvers, respectively. Contrary to our study, Whitney et al. reported that there was no statistically significant difference among the subscale scores of the DIH in patients diagnosed with BPPV[30]. In some of the studies, the highest scores taken from the subscales were physical, functional and emotional groups, respectively[28]. Some of the studies reported that patients with BPPV got the pre- and post-repositioning highest scores from the physical subscale[31]. When we compared the scores obtained from the subscales of the DIH in the literature review, similar and different aspects were determined with our study. In the literature, it is thought that the differences in the scores obtained from the subscales of the DIH may be related to the differences of the regions where the studies were conducted and the sociocultural levels and educational levels of patients.

It was found in our study that the total mean scores obtained from the VDI-QOL and VDI-SS increased statistically significantly after repositioning maneuvers. The fact that the study by Kulcu et al. (2008) found statistically significant positive improvements in quality of life of individuals diagnosed with BPPV after repositioning maneuvers and vestibular rehabilitation exercises supports our study[32].

Given the literature, it was found that patients diagnosed with BPPV showed statistically significant positive improvements in their vertigo symptoms after repositioning

maneuvers and vestibular rehabilitation exercises. These results demonstrate the strong effect of reposition maneuvers on quality of life and vertigo symptoms[32-34].

Our study revealed that repositioning maneuvers positively affected the quality of life of patients with BPPV and reduced the symptoms of vertigo and dizziness. Since our study was conducted with videonystagmography, we were able to more accurately identify the subtypes of BPPV. For further studies, it will be usefull to study a larger sample group with videonystagmography and include multichannel BPPV to evaluate variables such as quality of life, vertigo symptoms and dizziness levels.

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