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Disability in Protracted Benign Paroxysmal Positional Vertigo at One Month from Symptom Onset - A Questionnaire Survey

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Abstract

Objectives: The purpose of this study was to assess the disability of patients with Benign Paroxysmal Positional Vertigo (BPPV) at one month from symptom onset.

Methods: This was a cross-sectional study conducted at multiple institutions. One hundred and seventeen BPPV patients at one month from symptom onset were included (32 male, 85 female; mean age 67.7 years). After answering whether their symptoms were cured or persistent, patients completed 3 questionnaires: the Dizziness Handicap Inventory (DHI), The Vertigo Symptom Scale-Short Form (VSS-sf) to assess the frequency of vestibular and autonomic symptoms, and the Hospital Anxiety and Depression Scale (HADS). The presence of nystagmus and type of BPPV were also checked.

Results: Fifty-five patients (47.0%) reported themselves cured and 62 (53.0%) reported persistent symptoms (protracted). Among the protracted patients, 44 (71.0%) patients had positional/positioning nystagmus while 18 (29.0%) patients did not. The protracted patients with nystagmus showed significantly higher DHI scores in total, physical and functional components compared with the cured patients ($p<0.05$). The protracted patients without nystagmus showed significantly higher DHI scores in physical components than the cured patients ($p<0.05$). The protracted patients with/without nystagmus showed significantly higher vestibular symptoms scores in VSS-sf and depressive scores in HADS in comparison with the cured patients ($p<0.05$).

Conclusion: About a half of BPPV patients continue to have dizziness at one month from symptom onset. These patients have higher levels of disability in daily life and feelings of depression.

Keywords: Benign paroxysmal positional vertigo; Handicap; Anxiety; Depression; Quality of life; Disability; Dizziness

Introduction

Benign Paroxysmal Positional Vertigo (BPPV) is characterized by a spinning sensation for periods from a few seconds to 1 minute, triggered by an abrupt change in head position with respect to gravity [1,2]. BPPV is one of the most commonly recognized forms of peripheral vestibular vertigo encountered in neuro-otology clinics, with a reported prevalence of 10.7-64.0 cases per 100,000 people and a lifetime prevalence of 2.4% [3,4]. Patients with vertiginous symptoms will ultimately be diagnosed with BPPV in 17% to 42% of cases [2].

BPPV is considered to result from small particles trapped in the semicircular canals [5]. These particles are thought to be otoconia dislodged from the utricle. Physical maneuvers and exercises, which aim to relocate the dislodged otoconia back into the vestibule, have been shown to be effective in treating BPPV [6,7]. It has also been reported that the symptoms of BPPV generally subside or disappear around one month from onset in posterior canal BPPV, and within two weeks of onset in horizontal canal BPPV [8]. However, approximately 30%-60% of patients who have successful treatment (based on the absence of positional nystagmus) continue to report residual dizziness or imbalance [9,10]. Additionally, recurrences of BPPV are frequently observed; the rate of recurrence is approximately 7%-23% per year, and the rate of long-term relapse may approach 50% [4,11,12].

Patients with BPPV frequently have physical, functional, and emotional difficulties that can affect their social and family lives [13]. Their distress can have a negative impact on their health-related quality of life (HRQOL).

The impact of BPPV on HRQOL at the onset of symptoms has been reported in previous studies [14-16]. However, little is known about how protracted BPPV affects the HRQOL. In the present study, we assessed dizziness handicap, depression and anxiety in BPPV patients one month after symptom onset. The aim of this study was to assess the impact of protracted BPPV on HRQOL and mental health.

Materials and Methods

Study design

This study was a cross-sectional study with continuous sampling performed in neuro-otological clinics at six secondary care hospitals and seven tertiary care hospitals. This study was approved by the Research Ethics Committee, Graduate School of Medicine, at Nagoya City University (identification number: 1296) and at each hospital. This study was conducted according to the tenets of the Declaration of Helsinki. Written informed consent was obtained from each participant.

Subjects

Previously diagnosed BPPV patients who presented at a neuro-otology clinic one month after symptom onset (defined as 28-55 days) between March 2016 and March 2019 were recruited.

We excluded patients who had a history or presence of other inner ear diseases apart from BPPV.

We used the diagnostic criteria of BPPV formulated by the Committee for Diagnosis of BPPV which were made in accordance with the diagnostic guidelines of the Classification of Vestibular Disorders of the Barany Society [17]. We classified patients into the following types according to their nystagmus findings: canalolithiasis of the posterior canal (P-BPPV), canalolithiasis of the lateral canal (L-ca-BPPV), cupulolithiasis of the lateral canal (L-cu-BPPV). Patients in whom positional or positioning nystagmus could not be confirmed (probable BPPV) were excluded from the analyses.

There were 175 patients who were diagnosed as having BPPV. Among them, 14 patients declined to participate, so 161 patients participated in this study. Among 161 patients, 44 patients were excluded from the analysis: 39 patients with probable BPPV, 4 with atypical positioning nystagmus for BPPV, and 1 for the presence of spontaneous nystagmus. Therefore 117 patients with definite BPPV (32 male, 85 female; age range 31-90 years old: average 67.7 years old) were analyzed.

Methods

The patients were asked to report whether their vertigo/dizziness was cured or persistent in a questionnaire, and then filled in the following questionnaires: handicap caused by dizziness (the Dizziness Handicap Inventory; DHI), vestibular and autonomic symptoms' frequency (The Vertigo Symptom Scale-short form; VSS-sf), and depression and anxiety (Hospital Anxiety and Depression Scale; HADS).

The patients were checked for the presence or absence of nystagmus using the positional and positioning nystagmus tests with CCD goggles on the same day.

Dizziness Handicap Inventory (DHI): The DHI is a 25-item, self-report questionnaire that evaluates the impact of dizziness or vertigo on quality of life, and can be used to assess the severity and effect of therapeutic treatments. The DHI has three subscales: the physical subscale (DHI-P), the emotional subscale (DHI-E), and the functional subscale (DHI-F) [18,19].

Vertigo symptom scale–short form (VSS-sf): The VSS-sf is a 15-item, self-report instrument that measures the frequency of vertigo, dizziness, unsteadiness, and concomitant autonomic/anxiety symptoms over the preceding month. The VSS-sf has two subscales: the vestibular-balance subscale (VSS-sf-V) and the autonomic-anxiety subscale (VSSsf-A) [20,21].

Hospital Anxiety and Depression Scale (HADS): The HADS is a 14-item scale that evaluates general anxiety and depression in patients in a non-psychiatric hospital setting. It comprises of the depression subscale (HADS-D) and the anxiety subscale (HADS-A) [22,23].

Statistical analysis: Data are shown as mean ± standard errors. Differences in binary data were assessed using a chi-square test. For those with an expected value of 5 or less, Fisher's direct method was used. Differences in continuous data were assessed using a one-way ANOVA, and the Bonferroni method was used as a post hoc test. A difference of $p<0.05$ was considered significant.

Results

Table 1 shows the characteristics of the 117 patients with definite BPPV included in this study. Among them, 55 patients (47.0%) classified their vertigo/dizziness as cured (cured) while 62 (53.0%) patients classified it as persistent (protracted) at one month from the onset of their disease. None of the cured patients showed any nystagmus during the positional or positioning nystagmus tests under CCD goggles. On the other hand, among the 62 protracted patients, 44 patients (71.0%) still had positional or positioning nystagmus whereas 18 (29.0%) did not have any nystagmus during tests performed on the day they answered the questionnaires.

	Cured	Protracted		P value
		Nystagmus (-)	Nystagmus (+)	
	N (%)	N (%)	N (%)	
N	55 (47.0)	18 (15.4)	44 (37.6)	
Age (mean ± SE)	66.8 ± 1.6	64.3 ± 3.1	70.3 ± 1.5	0.132
Gender				
Male	12 (21.8)	5 (27.8)	15 (34.1)	0.36
Female	43 (78.2)	13 (72.2)	29 (65.9)	
Duration from onset (mean ± SE)	38.4 ± 8.9	41.6 ± 3.7	37.4 ± 1.3	0.546
Previous history of BPPV				
Yes	7 (12.7)	4 (22.2)	4 (9.1)	0.362
No	48 (87.3)	14 (77.8)	40 (90.9)	
Affected semicircular canal				
Posterior	33 (60.0)	7 (38.9)	22 (50.0)	0.262
Lateral	22 (40.0)	11 (61.1)	22 (50.0)	
Canalolithiasis	14 (25.5)	7 (38.9)	12 (27.3)	
Cupulolithiasis	8 (14.5)	4 (22.2)	10 (22.7)	

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Treatment				
Canalith Repositioning Procedure	21 (38.2)	8 (44.4)	11 (25.0)	0.237
Physical maneuvers and exercises	48 (87.3)	14 (77.8)	36 (81.8)	0.579

Table 1: Patient characteristics.

There were no significant differences between the cured and protracted patient groups in age, gender, duration from onset, previous history of BPPV, affected semicircular canal or treatments ($p>0.05$). Furthermore, there were no significant differences in those variables between the protracted patients with nystagmus and those without nystagmus ($p>0.05$).

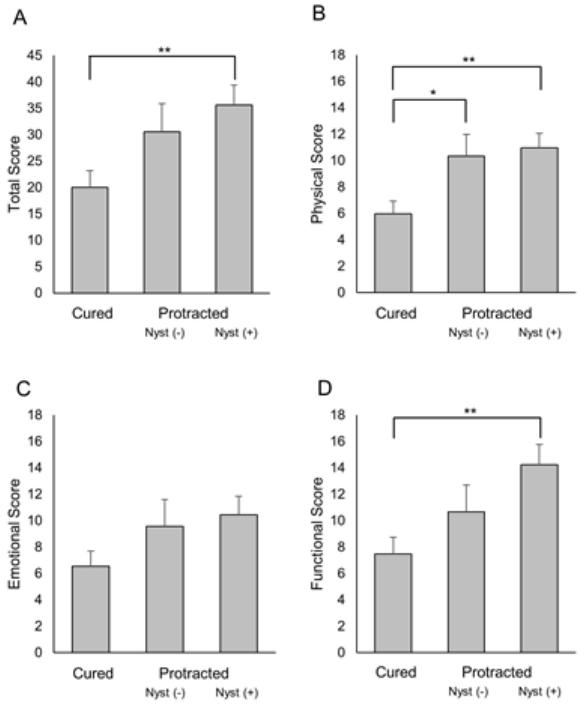

Figure 1: Dizziness Handicap Inventory (DHI) in cured and protracted patients with BPPV. A. Total scores, B. Physical scores, C. Emotional scores, and D. Functional scores of DHI in cured and protracted patients of BPPV. Data are shown as mean ± SE. Nyst (+): nystagmus present; Nyst (-): nystagmus absent; * $p<0.05$, ** $p<0.01$.

We assessed the dizziness handicap during daily life using the DHI in each patient group. There were significant differences in the total scores and the physical and functional components of the DHI among the three BPPV patient groups: cured, protracted without nystagmus, and protracted with nystagmus (one-way ANOVA, $p<0.01$), while there were no significant differences in the emotional component of the DHI among the three patient groups ($p>0.05$; Figure 1). Post-hoc analysis revealed that there were significant differences in total, physical and functional scores between the cured patients and protracted patients with nystagmus (Bonferroni test, $p<0.01$ in total, physical and functional scores; Figure 1). There were also significant differences in physical scores between the cured patients and protracted patients without nystagmus (Bonferroni test, $p<0.05$; Figure 1B).

The frequency of vertigo/dizziness and concomitant autonomic/anxiety symptoms were assessed using the VSS-sf (Figure 2). There were significant differences in vestibular symptom scores among the three BPPV patient groups (one-way ANOVA, $p<0.01$), while there were no significant differences in the autonomic-anxiety symptom scores among them ($p>0.05$). The protracted patients, both with and without nystagmus, had significantly higher VSS-sf vestibular scores compared to cured patients (Bonferroni test, $p<0.01$ and $p<0.05$, respectively; Figure 2A).

The psychological status of patients was assessed using HADS (Figure 3). There were significant differences in depressive symptom scores as well as in anxiety symptom scores among the three BPPV patient groups (one-way ANOVA, $p<0.01$ and $p<0.05$). Post-hoc analysis revealed that the protracted patients, both with and without nystagmus, had significantly higher depressive scores than the cured patient group (Bonferroni test, $p<0.05$, respectively). The protracted patients with nystagmus also showed higher anxiety symptom scores compared to the cured patient group (Bonferroni test, $p<0.05$).

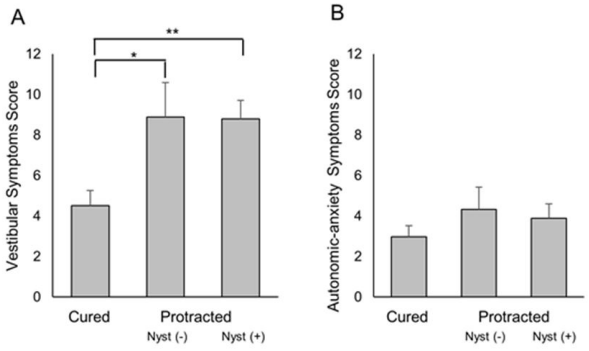

Figure 2: Vertigo Symptom Scales-short form (VSS-sf) in cured and protracted patients with BPPV. A. Vestibular, and B. Autonomic symptoms scores of VSS-sf. * $p<0.05$, ** $p<0.01$.

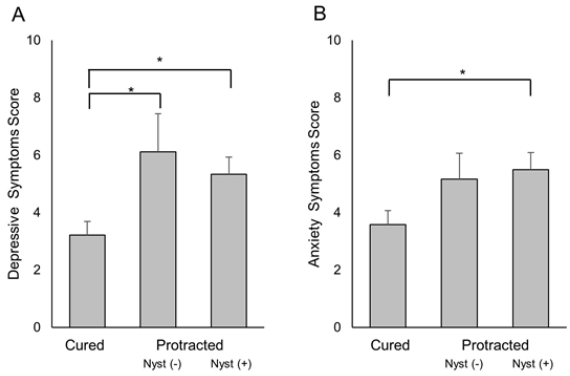

Figure 3: Hospital Anxiety and Depression Scales (HADS) in cured and protracted patients with BPPV. Depressive, and B. Anxiety symptom scores of HADS. * $p<0.05$.

Discussion

In the present study, we assessed depression, anxiety and the impact of dizziness on the quality of life in BPPV patients one month after symptom onset, and showed that half of patients still had a dizziness handicap accompanied by depression and anxiety. One third of the BPPV patients who reported having dizziness/vertigo one month after onset did not show any nystagmus, but did continue to have high levels of dizziness handicap and anxiety.

BPPV is the most common cause of vertigo, manifesting with transient paroxysmal vertigo and nystagmus triggered by changes in head position. BPPV frequently causes serious difficulties in physical, functional, and emotional activities, resulting in a negative impact on HRQOL. Disability perceived by BPPV patients at the onset of symptoms has been assessed previously [15,16]. Munoz et al. assessed disability in posterior canal BPPV patients using the DHI prior to treatment, and showed that BPPV had a significantly negative impact on the quality of life of patients, associated with feelings of depression and difficulties turning over in bed [16]. Our study showed that BPPV continues to have a negative impact on the HRQOL in half of patients one month after symptom onset.

Most patients with BPPV are cured in their early period. More than 90% of BPPV patients can be successfully treated with the canalith repositioning procedure (CRP) which aims to relocate the dislodged otoconia back into the vestibule [24]. Even without performing CRP, the symptoms of BPPV resolve spontaneously in many patients. It has been reported that the symptoms of BPPV generally subside or disappear around 40 days from the onset in two thirds of patients with posterior canal BPPV, and within 16 days from the onset in 90% of those with horizontal canal BPPV [8]. However, even after successful CRP, a portion of patients continue to report dizziness and/or imbalance without positional nystagmus [9,10]. Seok et al. prospectively performed CRP in consecutive BPPV patients and showed that approximately 60% of patients still had dizziness after successful CRP [9]. They also showed a significant correlation between the duration of BPPV and residual dizziness. In the present study, approximately half of BPPV patients continued to have dizziness one month after onset. However, there were no significant correlations between residual dizziness and the duration of the disease. No nystagmus was observed in positional or positioning tests in 30% of the BPPV patients who reported having persistent dizziness in the present study. This rate of residual dizziness is much smaller than previous studies which made their assessments a few days after successful CRP, and are consistent with a cumulative decrease of residual dizziness during the follow-up period [9,10].

Several mechanisms have been postulated to explain residual dizziness after successful treatment [9,10]. First, small otoconia remaining after incomplete CRP could produce mild positional vertigo, though insufficient to provoke nystagmus. Second, dysfunction of the otolith organ could cause dizziness since involvement of the otolith organs in BPPV has been shown in postmortem studies [25], in otolith function tests such as ocular vestibular evoked myogenic potentials [26] and in studies of subjective visual horizontal/vertical [27]. Third, incomplete adaptation after successful CRP might cause dizziness. In the present study, patients who had persistent dizziness without positional/positioning nystagmus showed higher DHI scores than cured patients, but lower than those who had persistent dizziness with nystagmus. The cause of persistent dizziness in these patients remains unclear.

Psychological factors can influence the occurrence and recovery from vestibular disorders, including BPPV. It has been reported that major depression and generalized anxiety disorder are more prevalent in BPPV patient groups compared with the control groups [28]. A nation-wide population-based study has shown that patients with depressive disorders have a significantly increased risk of developing BPPV [29]. It has also been shown that presence of anxiety and depression symptoms significantly reduced the efficacy of CRP and increased the risk of recurrence in BPPV patients [30]. In the present study, the protracted patients showed higher scores on both depressive and anxiety scales in HADS. It is possible that the presence of these psychological factors affected the recovery process from BPPV in these patients. Conversely, it is also possible that patients who initially had no depression or anxiety may develop psychological problems while suffering from the disease.

This study has several limitations. First, there might be a bias in the patient groups because this study included patients who presented at outpatient clinics one month after the onset of BPPV symptoms, but did not include those patients who stopped attending outpatient clinics, probably due to disease remission. As such, it is possible that the ratio of cured patients might be underestimated in this study. Second, we could not compare changes in the impact of dizziness and psychological symptoms before and after the disease because we did not assess them before the onset. However, the DHI scores and psychological scores in this study were comparable to those scores reported at the onset of BPPV in the literature [15]. Third, we were unable to estimate the effect of vestibular dysfunction because we did not perform vestibular function tests such as the caloric test, the vestibular evoked myogenic potential test, or the video head impulse test. Comorbidity of peripheral vestibular dysfunction might affect the persistence of the symptoms in this study [31].

Conclusion

In conclusion, we have shown that half of BPPV patients continue to have a significant dizziness handicap at one month from the onset of symptoms. Since BPPV patients with protracted vertigo/dizziness symptoms have high rate of depression and anxiety, it is recommended that their psychological state is evaluated.

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