

ORIGINAL ARTICLE

Idiopathic Benign Paroxysmal Positional Vertigo (BPPV): Recurrent Versus Alternating Relapses

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Objective: Although relapse of BPPV is frequent, its basic characteristics have not been defined yet. In this study we enrolled patients with idiopathic BPPV that had never previously suffered from vertigo and observed them from the onset of disease.

Material and Methods: We studied 61 patients and included them in a follow up period comprised between 24 and 108 months to identify relapses. We studied the side of relapse and divided patients into a group that relapsed in the same side of the first episode (recurrent BPPV) and another that relapsed in the contralateral ear (alternating BPPV). Separately we studied patients with simultaneous bilateral BPPV. The Kaplan-Meier method was applied as a predictor of relapses.

Results: During the follow up period, we observed a relapse in 23 patients (37%). In 9 patients (39,1%) relapse occurred in the same side of the first attack, in 12 patients (52,2%) in the contralateral labyrinth, and in 2 (8,7%) there was a simultaneous involvement of both sides. Using the Kaplan-Meier method, we identified a relapse in 73% of recurrent BPPV and only in 25% of alternating BPPV patients in a 12-month period (log-rank $p=0.009$).

Conclusion: The differences found in the recurrence characteristics between patients with a recurrent BPPV compared to those with alternating BPPV supports the classification proposed.

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Benign paroxysmal positional vertigo (BPPV) is a common cause of dizziness characterized by sudden attacks of vertigo lasting 10 to 30 seconds and evoked by head movements or specific positions such as lying down or rolling over in bed.

The pathognomonic clinical sign is the positional nystagmus evoked by diagnostic maneuvers.

Although aetiology is still unknown, a close relationship between the onset of vertigo and head trauma has been found ^[1]; other authors report an association with other ear pathologies such as Meniere's disease and vestibular neuritis. Last, migraine seems to be 3 times more common in patients with BPPV compared to the general population ^[2,3].

BPPV is characterized by a symptomatic period of days or weeks; treatment is based on the particle

repositioning manoeuvres ^[4-7] with an excellent success rate. The maneuvers are easy to perform and usually lead to immediate cessation of positional vertigo ^[8,9].

Despite successful treatment, the disease may relapse after a symptom-free period of months or years.

Several authors focused their studies on BPPV relapses, reporting a percentage of recurrent BPPV between 22,6% and 38% ^[9-12].

In a study with 104 patients by Del Rio et al ^[12], the rate of recurrent BPPV was 22.6% after a follow up of 15 months. Nunez et al ^[9] found a recurrence rate of 26.8% in a group of 168 patients with an average follow up of 15,9 months.

In a previous study from our group ^[10], we studied 414 patients with a mean follow up of 3 years and reported a 28.5% recurrence rate. Last, Sakaida et al ^[11] observed

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a relapse percentage of 38% with a follow up of 52 months.

The purpose of these studies was to analyze the rate of relapses and identify prognostic factors. Ages, sex, duration of symptoms, type of repositioning maneuvers or routine of daily exercises were investigated but no prognostic factors were identified.

In contrary, rate of relapses seems to be proportional to the length of follow up: the longer the time of follow up, the higher the chances of relapsing. In several studies, a Kaplan-Meier estimation confirms the relationship between length of observation and incidence of relapse^[9,11]. Nunez^[9] was able to predict a relapse in 50% of patients after 40 months from the first episode; these results were also confirmed by Sakaida^[11].

Despite the frequency of recurrent BPPV, its basic characteristics have not been defined yet. For this reason, we decided to study patients with idiopathic BPPV that had never suffered from vertigo and observe them from the onset of the disease.

We studied the characteristics of these subjects and followed them for a period comprised between 24 and 108 months. The Kaplan-Meyer method was used as a predictor of relapse.

Material and Methods

Among 180 patients with BPPV afferent to the ENT clinic of the University of Rome "La Sapienza", we selected patients with idiopathic BPPV observed by us from their first attack of disease. We excluded patients with a history of recent head trauma, Menière's disease or vestibular neuritis. The diagnosis of BPPV was supported by a history of positional vertigo and evidence of positional nystagmus.

Posterior semicircular canal (PSC) involvement was diagnosed by observation of upbeat torsional nystagmus during the Dix and Hallpike test (DHT). Horizontal semicircular canal (HSC) involvement was identified by a geotropic horizontal nystagmus induced by McClure maneuver (MCM). The presence of latency, short duration (seconds to a few minutes) and paroxysm of the nystagmus were necessary for the

diagnosis. To observe the nystagmus, we used an infrared video-nystagmoscopy system (IR-VNS mod. Lusio).

Once the involved canal was identified, patients were treated with the appropriate particle repositioning procedure: in case of PSC involvement, subjects were treated with the modified Epley's maneuver proposed by Parnes and Price-Jones^[6] without the mastoid vibrator. In case of HSC involvement, patients were treated with the Lempert's maneuver^[7].

Patients were given instructions to avoid rapid head movements, extreme flexion and extension of the neck and positions that could induce dizziness until the next visit. After 2-3 days, all patients were examined and tested again for persistence of BPPV; the assessment of successful treatment included both the patient's report of absence of vertigo and a negative positional test result. If the positional nystagmus was found, a new repositioning maneuvers was performed and the patient was referred to a new examination after 3 days. This procedure was performed until the disappearance of both nystagmus and symptoms.

The distribution by sex and age at the first episode of illness, the concomitant diseases, the side, the involved semicircular canal and the percentage of healing with one repositioning manoeuvre was calculated

Patients were followed for a period of at least 24 months and up to 108 months to evaluate relapses. The definition of relapse, according to Epley^[4], included any new attack that occurred at least one month after the previous BPPV crisis. The percentage of patients with relapses was calculated and compared to that of non-relapsing patients (mono-episodic BPPV).

Subjects with relapses were divided into two groups: the first group was composed of patients with a relapse in the same side (recurrent BPPV); the second group included patients having non simultaneous bilateral relapses (alternating BPPV, in contrast with other authors that considered this group as unilateral^[10]).

In these two groups we calculated the time between the onset of disease and the relapse, the involved semicircular canal and the percentage of healing with

one repositioning manoeuvre. Statistical analysis was the Mann-Whitney X2 test or Kruskal-Wallis test. Statistical significance was defined as $p < 0.05$.

The Kaplan-Meier method was used to evaluate the expectation of relapse. The log-rank test was used to compare subgroups (recurrent BPPV vs alternating BPPV).

Results

61 patients with BPPV met our criteria of selection and were included in the study. The mean age at the onset of disease was $57 \text{ years} \pm 13,8$ Figure 1.

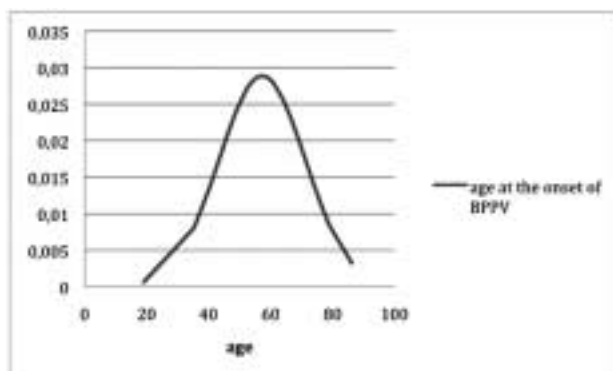


Figure 1. Idiopathic group: age distribution at the onset of BPPV.

The group was composed of 19 men (31.15%, mean age 56 ± 14.58 years) and 42 women (68.85%, mean age 57 ± 13.63 years). No statistical difference in age was observed between the two sexes.

Migraine was present in 31.1% of patients (n.19); females were more affected than males (male : female 1:3.8).

Out of 61 patients, 59 (96.8%) had a unilateral BPPV and 2 (3.2%) had a simultaneous bilateral involvement. In patients with unilateral VPPB, the involved side was the right side in 30 (50.8%) and the left side in 29 (49.2%).

Among subjects with unilateral VPPB, the semicircular canal involved by disease was the posterior semicircular canal (PSC) in 50 patients (84.7%) and the horizontal semicircular canal (HSC) in 9 patients (15.3%). No patients showed an involvement of the superior semicircular canal (SSC).

The percentage of healing with one particle repositioning maneuver was 72% (n.36) in patients with a PSC involvement and 55.5% (n.5) in patients with HSC involvement. Other patients required more than one maneuver (average of 2,3 maneuvers in PSC and 3 in HSC VPPB).

In the simultaneous bilateral group, the involved semicircular canal was the HSC in one patient and the PSC in the other one. The patient with HSC-BPPV required 2 maneuvers for the left side and 1 manoeuvre for the right. The second patient required one maneuver for each side to obtain the disappearance of nystagmus and vertigo.

Relapses of BPPV was observed in 23 patients (37.7%). The mean age of this group was 56 ± 13 years; the group was composed of 7 males (30.4%) and 16 females (69.6%). No statistical differences in age, sex and migraine presence was found between relapsing and non-relapsing patients (Table 1).

Table 1. Patients with relapsing and mono-episodic BPPV.

BPPV n.61	Relapsing BPPV n. 23	Monoepisodic BPPV n.38	p value
Age	56 years	58 years	0,669
Sex (women)	n. 16 (69,6%)	n.26 (68,4%)	0,925
Migraine	n.5 (21,7%)	n.14 (36,8%)	0,217

In 9 patients (39.1%) relapse occurred in the same side of the first attack (recurrent BPPV) while in 12 patients (52.2%) the contralateral labyrinth (alternating BPPV) was affected. In 2 patients (8.7%) simultaneous bilateral involvement was observed.

In the recurrent BPPV group, the first relapse occurred after a mean time of 24 months (min 2, max 94, median 7), while in the alternating BPPV group it occurred after a mean time of 42 months (min 5, max 105, median 39) (Figure 2).

Many patients reported that the symptoms of the relapse attack were not as severe as the first episode.

In 6 out of 9 patients affected by recurrent BPPV and in 10 out of 12 subjects with alternating BPPV the semicircular canal involved during the relapse was the same of the first attack.

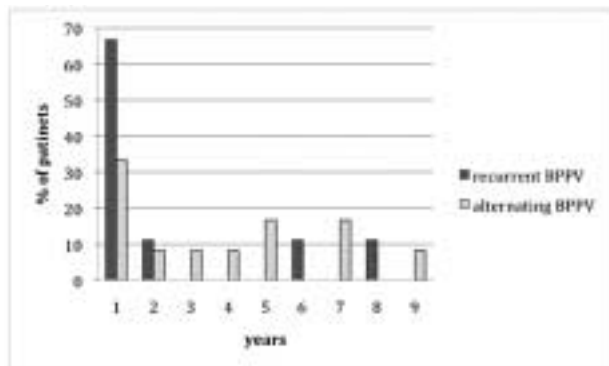


Figure 2. Relapsing groups: recurrent versus alternating BPPV groups.

In the recurrent BPPV group, 100% of HSC and 83.3% of PSC subjects were healed with one repositioning manoeuvre.

In the alternating BPPV group, 100% HSC and 50% of PSC patients were healed with one maneuver.

The difference in the number of maneuvers between alternating and recurrent BPPV patients was not statistically significant ($p=0.18$).

In one patient with bilateral involvement one maneuver for side was necessary, while in the other one 3 maneuvers for the left side and 1 for the right side were performed.

During the follow up period 10 out of 23 relapsing patients (43.5%) did not report additional relapses. Patients with recurrent BPPV had new relapses always on the same ear.

We compared the period from the onset of the disease to the first relapse in recurrent and alternating BPPV groups. Within 12 months, patients in the recurrent BPPV group had a 73% relapse rate, while patients in the alternating BPPV group had a 25% relapse rate. The log-rank test revealed a significant difference in the time of recurrence between the two groups ($p=0.009$) (Figure 3)

Discussion

Several pathologies of the inner ear can be characterized by vertigo; BPPV is the most frequent among them.

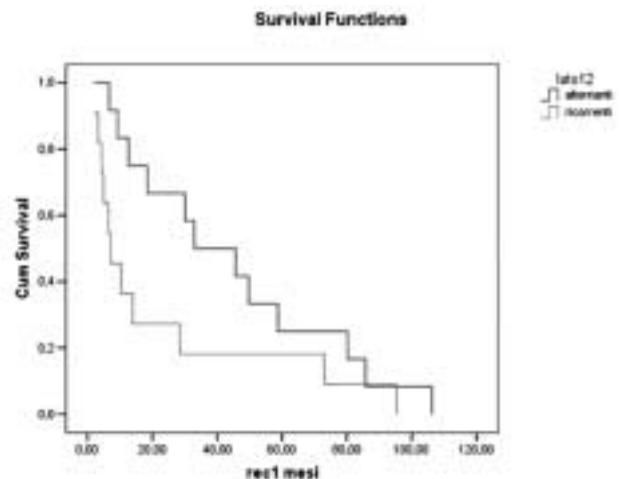


Figure 3. Kaplan Meier estimation of time to recurrence for the recurrent and alternating BPPV groups (log-rank $p=0.009$).

Although most cases of BPPV are idiopathic^[1,9,10], several inner ear disorders could be associated with BPPV (secondary BPPV) such as Menière's disease, vestibular neuritis and head trauma.

A higher frequency of BPPV relapse can be observed in patients with Menière's disease, probably due to a macular damage resulting from the endolymphatic hydrops^[12,14,15].

An alteration in the natural history of BPPV could also be observed in subjects with vestibular neuritis. Among these patients ($n=4$), only one had a recurrence of the disease; relapse occurred in the same ear affected by vestibular neuritis.

For these reasons we decided to exclude from our study patients suffering from Menière's disease or vestibular neuritis.

We also excluded patients that referred a head injury that could be identified as the etiological factor for BPPV: head trauma has been reported to be the most commonly identified aetiology of BPPV accounting for 6.2-10.8% of cases^[1,16,17]. We excluded post-traumatic patients because the pathophysiology and the time course of BPPV may differ in idiopathic vs post-traumatic cases^[1].

We decided to include in the study only patients with idiopathic BPPV to evaluate the recurrence rate and identify prognostic factors for relapse of the disease.

Many patients that refer to the ENT specialist for benign positional paroxysmal vertigo report a history of previous episodes of vertigo. In a previous study^[10], we observed that several patients that required an examination for vertigo had a previous history of vertigo or dizziness. Because of the difficulty in correctly defining the nature of the previous episode of vertigo, we included in our study only patients with a negative history for vertigo that were observed at the onset of disease.

The mean age at the onset of BPPV in our group was 57 years \pm 13.6 and a marked female preponderance (61.8%) was present, confirming previous reports^[16,17].

The migraine was more frequent in our group compared to general population; similar data have already been reported in literature^[2,3].

BPPV can present two types of evolution: the first type is characterized by a sudden attack that does not relapse after treatment (monoepisodic BPPV).

The second type of evolution is characterized by several relapses alternating with asymptomatic periods (relapsing BPPV). We considered as a relapse the attack of vertigo that occurred at least one month after the resolution of the previous episode^[4]. In each episode we performed diagnostic maneuvers every three days until we obtained the disappearance of both nystagmus and associated symptoms; we considered the patient cured only when the diagnostic test became negative, unlike what was reported by Nunez^[9].

Relapses have been studied by several authors^[4,7,10-13,18] but, at present, the factors that can facilitate relapses were not clarified.

The rate of relapses we found in this study is 37.7%; this is consistent with percentages reported by other authors^[9-12].

Many patients with relapse mentioned that the episode was less severe than the first attack; this finding has also been reported by other authors^[9]. We hypothesize that this phenomenon could be due to the consciousness of symptoms and to the patient's ability to avoid specific movements and trigger positions.

We didn't find a higher prevalence of migraine in relapsing patients compared to mono-episodic

patients. Thus, we believe that migraine does not predispose for BPPV relapse, in contrast with Ishiyama^[2].

We divided relapsing patients into two groups: the first group was composed of patients with a relapse in the same side (recurrent BPPV); the second group included patients having non simultaneous bilateral relapses (alternating BPPV), in contrast with other authors that considered this group as unilateral^[1].

Also, we considered separately patients that had the relapse at the same time in both ears (simultaneous bilateral BPPV); this group represented the 3,2% of our patients, in accordance with other studies^[1,10,17].

In the present study, we applied this classification to the relapsing BPPV group (23 patients) to study if there were significant differences among the recurrent and alternating BPPV groups.

The difference (recurrent vs alternating) in age (56 vs 58), sex (female 6 vs 9) and migraine (4 vs 1) was not statistically significant.

A significant difference was found in the disease-free time before the first relapse: the mean time between the onset of vertigo and the first relapse was longer in patients with alternating BPPV compared to recurrent BPPV patients. This observation was confirmed by the Kaplan-Meier method that resulted statistically significant (log-rank $p=0.009$).

This also confirms the classification published in a previous paper^[10] in which we proposed a division between alternating and recurrent BPPV patients.

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