ORIGINAL ARTICLE

Benign Paroxysmal Positional Vertigo – A Review of 101 Cases

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KEYWORDS
Vertigo;
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Abstract
Introduction and objective: Benign paroxysmal positional vertigo is one of the most common vestibular disorders, with a lifetime prevalence of 2.4%. This study aimed to assess age, gender, lesion type and site, association with other vestibular diseases, progression and recurrence in a Portuguese population.
Methods: This was a retrospective observational study of 101 patients diagnosed with benign paroxysmal positional vertigo by the same senior doctor, in a tertiary academic hospital, between January 2009 and May 2011.
Results: A total of 101 cases were pooled, with a mean age of 56.57±15.33 years (15–90 years). From these, 72.3% were women. The posterior canal was affected in 72.3%, the lateral in 24.7%, the anterior in 2% and multiple canals in 1%. Unilateral canal and left labyrinth involvement were more frequent. The therapeutic maneuver used most was Epley’s. Recurrence was observed in 10.9% of the cases. It was idiopathic in 83.2% of cases. No association was found between the number of maneuvers necessary to treat benign paroxysmal positional vertigo and etiology.
Conclusion: Benign paroxysmal positional vertigo is more frequent in female subjects, in the 6th decade and involves preferably the posterior semicircular canal of the right labyrinth. In most cases it is idiopathic and treatment with repositioning maneuvers has a mean success of 90%. Our results were in accordance with the literature; nevertheless, in this study the left labyrinth was most affected and the follow-up period was variable.
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### Vértigo posicional paroxístico benigno: revisión de 101 casos

**Resumen**

**Introducción y objetivo:** El vértigo posicional paroxístico benigno es uno de los trastornos vestibulares más comunes con una prevalencia de 2.4 por ciento. Este estudio tiene como objetivo evaluar la edad, sexo, tipo y localización de la lesión, la asociación con otras enfermedades vestibulares, la progresión y recurrencia en una población portuguesa.

**Métodos:** Estudio observacional retrospectivo de 101 pacientes con diagnóstico de vértigo posicional paroxístico benigno, por el mismo médico de alto nivel, en un hospital terciario universitario, entre enero de 2009 y mayo de 2011.

**Resultados:** Un total de 101 casos se combinaron con una edad media de 56,57 ± 15,33 años (15-90 años). De estos 72,3% eran mujeres. El canal posterior se vio afectado en el 72,3%, el lateral en el 24,7% de la anterior en un 2% y multicanal en el 1%. Canal unilaterial e implicación laberíntrica izquierda fueron más frecuentes. La maniobra terapéutica más utilizada fue de Epley. La recurrencia se observó en el 10,9% de los casos. Fue idiopática en 83,2% de los casos. No se encontró una asociación entre el número de maniobras necesarias para tratar el vértigo posicional paroxístico benigno y etiología.

**Conclusion:** El vértigo posicional paroxístico benigno es más frecuente en mujeres, en el sexto decenio e implica preferiblemente el canal semicircular posterior del laberinto derecho. En la mayoría de los casos es idiopática y el tratamiento con maniobras de reposición tiene un éxito medio del 90%. Nuestros resultados están de acuerdo con la literatura, sin embargo, en este estudio el laberinto izquierdo es el más afectado y el período de seguimiento es variable.

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### Introduction

Benign paroxysmal positional vertigo (BPPV) is one of the most common vestibular disorders. It is characterized by spells of vertigo and nystagmus of short duration that are elicited by turning the head in the plane of the affected semicircular canal. Vertigo and other associated symptoms are triggered by fragments of statocones coming from the utricle macula, which move to one or more semicircular canals and turn the cupula into a gravity-sensitive organ.

Pathophysiological theory of cupulolithiasis was described by Schneckeht. Such theory states that otolithic fragments detach from the utricle macula and stick to the semicircular cupule, which stops working as angular acceleration transducer and starts working as linear acceleration transducer. The canalithiasis theory explains that the fragments do not remain adhered to the semicircular canal cupula, but rather they float in the endolymph. Thus, the patient’s head movement causes these fragments to move and thus an inadequate stimulation of the canal cupula, generating vertigo symptoms.

Posterior canal involvement is characterized by rotatory and upbeat vertical positional nystagmus (counterclockwise in right labyrinth lesions and clockwise in left labyrinth lesions). Exclusively counterclockwise or clockwise rotatory positional nystagmus suggests involvement of the vertical canal, although not defining which vertical canal is affected. In vertical canal involvement, canalithiasis is characterized by nystagmus lasting up to 1 min, and cupulolithiasis is evidenced by nystagmus lasting more than 1 min.

Lateral canal involvement is characterized by horizontal positional or positioning nystagmus. Horizontal positional nystagmus is geotropic when tilting the head to the right causes right horizontal nystagmus and tilting the head to the left causes left horizontal nystagmus. It is ageotropic when tilting the head to the right causes left horizontal nystagmus and tilting the head to the left causes right horizontal nystagmus.

BPPV originating from stimulation of the horizontal semicircular canal is the second most common type of BPPV, accounting for approximately 5%-15% of the patients. Its frequency has been occasionally reported up to 30%.

The main BPPV diagnostic maneuver for the posterior canal is the Dix Hallpike test, which aims at triggering the labyrinth symptom or sign such as vertigo, nausea and/or nystagmus. Anterior canal BPPV produces bilaterally positive Dix Hallpike maneuvers.

The Dix Hallpike provoking maneuver is used to diagnose the disease by moving the patient rapidly from a sitting position to a position of head hanging with each ear alternately undermost. This maneuver produces intense vertigo in conjunction with nystagmus, with a short latency, intensity characterized by crescendo and decrescendo element, reversal on returning to the upright position, and fatigability on repetitive provocation may easily establish the diagnosis of BPPV.
Lateral canal BPPV is diagnosed by McClure maneuver, when turning the head to either side in the supine 30° up with the horizontal position provokes intense vertigo and a purely horizontal nystagmus.²⁻⁴,¹²

In 1988, in Paris, Alain Semont et al. and in 1992, in the USA, Epley described the first statocane repositioning maneuvers (SRM). According to them, the success rate after one session was 83.96% for the Semont maneuver and 97.7% for the Epley’s.¹⁰ These repositioning maneuvers are the recommended therapy.¹,⁵,¹²

Despite the great efficacy of the SRM and the possible spontaneous resolution, in 20%–30% of the patients the disease can recur or persist.¹⁰ If the pathology persists other treatments may be necessary—vestibular rehabilitation exercises, vestibular function suppressive drugs or surgical procedures.¹⁰

There are multiple causes of vertigo that may be confused with BPPV and can be divided in otological: Ménière Disease, vestibular neuritis, labyrinthitis, superior canal dehiscence syndrome, posttraumatic vertigo; neurological: migraine associated dizziness, vertebrobasilar insufficiency, demyelinating diseases and CNS lesions; and others: anxiety or panic disorder, cervicogenic vertigo, medication side effects, postural hypotension.¹²

BPPV can be associated to vestibular neuritis, Ménière Disease and other diseases, nonetheless it seems idiopathic in most of the cases.²⁻⁴,⁶,⁷,¹¹

This study aims to assess age, gender, type and site of the lesion, association with other vestibular diseases, progression and recurrence in a Portuguese population.

Materials and Methods

Retrospective observational study of 101 patients diagnosed with BPPV, by the same senior doctor, in a tertiary academic hospital, between January 2009 and May 2011, with a mean follow-up of 182.6 days (7–1413).

This retrospective review was approved by the Institutional Review Board of our Hospital (Centro Hospitalar e Universitário de Coimbra).

Age, gender, race, type and site of lesions, etiology, association with other vestibular diseases, presence of cardiovascular risk factors, exams, disease progression and recurrence were recorded.

BPPV was diagnosed based on the clinical history and diagnostic maneuvers (Dix Hallpike and McClure).

Vestibular assessment as well as imaging was performed in patients with an atypical evolution as reported in the guideline.⁶ Vestibular function was evaluated using computerized videonystagmography (VNG: Ulmer versionC4, SYNAPSYS, Marseille, France, resolution of 0.1°, sampling rate of 100 Hz) comprising the following tests: saccadic movements, pendular tracking, optokinetic nystagmus, spontaneous nystagmus, positional and positioning nystagmus, rotatory and caloric testing.

Statistical analysis was performed using IBM SPSS Statistics 18 software. A simple descriptive statistic was applied to characterize the sample. Kruskal–Wallis test and χ² were used to compare independent samples. A 2-sided significance level of 0.05 was considered to be statistically significant.

Results

A total of 101 cases were pooled with a mean age of 56.57±15.33 years (15–90 years). From these 72.3% were women. All patients were Caucasian.

The posterior canal was affected more frequently (72.3%) than the lateral (24.7%) and anterior (2%) canals, multi-canal 1% (posterior/anterior). Unilateral canal involvement was more frequent than bilateral involvement (3%). Left labyrinth involvement was more frequent relatively to the right one (49.5% vs 47.5%)

The therapeutic maneuver more used was Epley’s, 70.3%, followed by Barbecue, 24.7%, Semont, 3%, and Brandt Daroff exercises, 2%. The number of therapeutic maneuvers done at diagnosis was one in 77.2%, two in 16.8%, three in 2% and zero in 4% (patients that refused or were too symptomatic at the moment of diagnosis). About 34.7% of patients repeated maneuvers at reevaluation. All patients were recommended postural care for 1 week (sleeping with elevated head (posterior/anterior canal), not lying on the side of disease, sleeping all night with the healthy ear down (horizontal canal) and avoiding cervical extension or rotation). Recurrence was observed in 10.9% of cases and 27.7% had previous episodes, similar or less intense.

Forty-six patients realized videonystagmography, from them 37% presented a vestibular paresis (in 6 cases ipsilateral to the BPPV and 11 contralateral), 21.7% presented unspecific central grafoelements and 41.3% were normal.

Further, 26.7% patients underwent imaging (magnetic imaging resonance–MRI in 10 patients and computed tomography–CT in 17 patients). From CT, there was 1 case of petrous bone fracture and other small infarcts; the other 15 were normal. From MRI: two cases showed white matter periventricular disease, one patient with a vascular conflict of the eight cranial nerves and a case of demyelinating lesions; and one case of a cerebellopontine angle lipoma.

The most frequent etiology is idiopathic, 83.2%, followed by head trauma, 9.9%, migraine in 2%, Ménière disease 1% and others 4% (demyelinating disease, labyrinthitis, cerebellopontine angle lipoma) (Fig. 1). There was not found a correlation between etiology and the number of maneuvers necessary to treat BPPV, P=.083. Comorbidities were found

![Figure 1: Etiology of BPPV.](image-url)
in 48% of patients (Fig. 2). No correlation was found between hypertension and recurrence (P=.453).

Discussion

BPPV is the most common vestibular disorder across the lifespan, with a prevalence of 2.4%. The age of onset is most commonly between the fifth and seventh decades of life. In our study the mean age was 56.57±15.33 which is in accordance to some large series, like Caldas et al. and Brandt et al. It causes quality of life loss, restrictions in social and domestic activities and relevant risk of falls.

Female subjects predominated in our series, similar to other published reports. Hormonal alterations more commonly found in women could favor the highest occurrence of BPPV.

The posterior canal was involved more often than the lateral and anterior canals; this finding is similar to other published results. The explanation for this is that the spatial position of the posterior semicircular canal is more favorable to the migration of statoconia from the utricle.

The disease was unilateral in most of the cases (97%) in our series. These results are in accordance with a report of 91.8% of unilateral cases. A multicanal involvement is usually rare and difficult to treat.

Left labyrinth involvement was more frequently involved. This is not in agreement with literature, which states that the right labyrinth is more frequently involved because patients sleep mostly on the right side.

BPPV was idiopathic in most of the patients in this study, which was also found in the literature, however it can also be secondary to hormonal or metabolic alterations or head injuries.

The treatment was done using repositioning maneuvers, namely Epley and Semont maneuvers for the vertical canals and Barbecue maneuver for the horizontal canals. The success rate was 90%. In the cases that the patient did not tolerate the repositioning maneuvers or when they fail, it is fundamental to reevaluate these patients to ensure that they are treated. The effectiveness of the maneuvers is reported to be from 78.0% to 95% in all of the cases. Postmaneuver restrictions were recommended to all patients but studies on their efficacy are contradictory, and Toupet et al. reported that these measures did not modify the intensity of vertigo and dizziness during the observation period.

In our study recurrence was 10.9%. The literature reports recurrence rates between 10% and 80%. The recurrence rate of BPPV has been estimated to be 15% per year. The variability in results among the authors can be explained by the difference in time and the mode of patient follow-up.

We verified that the number of maneuvers needed to treat the BPPV was not correlated with the etiology but literature reports that traumatic brain injury needs a greater number of maneuvers for treatment. In our patients, 10 had a traumatic brain injury, with 4 needing one more maneuver.

Concerning the VNG, the ipsilateral vestibular deficit may be related to the fact that the otoconia in some way prevents the normal flow of the endolymph. The contralateral vestibular deficit is related to the fact that these patients have more frequently other vestibular pathology.

We verified a high incidence of cardiovascular risk factors (48%). Some authors like Neuhauser et al., Appiani et al., and Waringhoff et al. consider that these factors may be in the etiology of BPPV as they can deteriorate the labyrinth and the otoconia detach. Data analysis revealed that among our patients the most frequent comorbid disorder was hypertension, but it did not influence recurrence. There is a recent study, De Stefano et al., 2014, where it is possible to demonstrate that hypertension alone influences recurrence and it appears that the presence of comorbidities exposes the patient to an increased risk of relapse of BPPV. In our cases this does not happen probably due to the size of the sample.

This study has the limitation of a variable follow-up period namely because some patients left the consultation.

Conclusion

BPPV is more frequent in female subjects, in 6th decade, and involves preferably the posterior semicircular canal of the right labyrinth. In most cases it is idiopathic and the treatment with repositioning maneuvers have a mean success of 90%. Our results are according to the literature, nevertheless in this study the left labyrinth is most affected and the follow-up period is variable.

Conflict of Interest

None declared.

References