

Clinical features of benign paroxysmal positional vertigo of the posterior semicircular canal

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Abstract

Objective: The aim of this study was to evaluate the relationship between age, gender and affected ear, in patients presenting benign paroxysmal positional vertigo.

Methods: This was a retrospective study. Data from benign paroxysmal positional vertigo clinical reports (January 2009–December 2014) were analysed. A total of 174 patients affected by benign paroxysmal positional vertigo of the posterior semicircular canal have been identified. Pearson chi-square test has been used to evaluate the probability of benign paroxysmal positional vertigo occurrence in relation to gender and side, within the studied groups. The level of significance was set at a $p < 0.05$.

Results: Considering age as a discriminant factor, three groups of patients were identified: group 1: 16 patients with an age < 40 years; group 2: 79 patients with an age between 40 and 65 years and group 3: 79 patients with an age > 65 years. In each group, the right posterior semicircular canal was involved in the majority of cases (group 1 incidence: 12/16; group 2 incidence: 49/79 and group 3 incidence: 52/79). In all three groups, female patients were significantly more affected (9/16 in group 1, 61/79 in group 2 and 55/79 in group 3).

Conclusion: Benign paroxysmal positional vertigo is most prevalent in female subjects having an age > 40 years and mainly involves the right posterior semicircular canal.

Keywords

Benign paroxysmal positional vertigo, dizziness, elderly

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Introduction

Benign paroxysmal positional vertigo (BPPV) is reported as one of the most common peripheral vestibular pathologies in adulthood. Back in 1921, Barany¹ was the first to identify this condition. He described it as a rapid vertigo episode caused by specific head movements and being associated to the presence of nystagmus during the manoeuvre. Nowadays, BPPV is described as an abnormal sensation of motion, usually evoked by critical head movements; its pathogenesis is usually attributed to freely floating otoconia debris, either residing in the canal portion of each semicircular canal (canalithiasis) or in the cupula of each crista ampullaris (cupulolithiasis). Nonetheless, the etiopathogenesis of otoconia detachment from utricular neuroepithelium is still undefined and under debate.^{2–5}

The BPPV can possibly affect both semicircular canals, but the posterior semicircular canal is most frequently involved.^{6,7} Treatment is usually defined by specific repositioning manoeuvres. The Epley and Semont manoeuvre is most widely used.^{8,9} In terms of clinical BPPV guidelines, Bhattacharyya et al.,^{10,11} recently published a set of

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criteria defining the management recommendations for this condition.

Since specific features of BPPV are not well defined in the current literature, the aim of the study was the evaluation of certain demographic BPPV traits such as gender, age, affected ear, type of treatment in a cohort of BPPV patients.

Patient and methods

The data were collected retroactively assessing clinical records, from January 2009 to December 2014.

A total of 174 BPPV patients were identified, presenting problems related to the posterior semicircular canal. For each patient, clinical history, age, gender, acute or previous vertigo episodes, affected-ear side, type of treatment (manoeuvre and/or habituation exercises) and persistent BPPV (before or after the first episode) symptoms were assessed.

The diagnosis of BPPV was defined primarily by a Dix–Hallpike’s or Semont manoeuvre and by the consequent presence of nystagmus, during each provocative test. Epley manoeuvre was always performed first; Semont was chosen only in selected cases (i.e. presence of excessive neck stiffness). Inclusion criteria were as follows: (1) a positive Dix–Hallpike’s or Semont manoeuvre and (2) neither history nor presence of sudden hearing loss.

All patients underwent a repositioning Semont or Dix–Hallpike manoeuvre, according to the American Academy of Otolaryngology guidelines.^{10,11} The manoeuvre was considered successful, if no nystagmus response was present at the subsequent vestibular test. Vestibular rehabilitation therapy was recommended to treat any residual dizziness and to reduce the anxious component related to the head movement of the subjects.

The data related to the BPPV patients reflect an average observation period of 14 ± 6 months.

The research protocol was conducted in compliance with the Helsinki Declaration (2008). Informed consent was not required because this study was retrospective and did not affect patient care in any way. Nevertheless, all subjects were informed about the project during their consequent programmed visits and provided their consent for the use of their data.

Statistical analysis

In order to evaluate the probability of BPPV in relation to gender and ear, we have used Pearson chi-square test. The level of significance was set to a p value <0.05 . The data were analysed using SPSS version 17.

Results

From the 174 patients included in the study, 49 were male and 125 were female; the age range was 17–87 years with a mean age of 60.03 years. Considering age as a discriminating factor, in order to evaluate possible demographic differences, patients were assigned in three age groups as follows: young

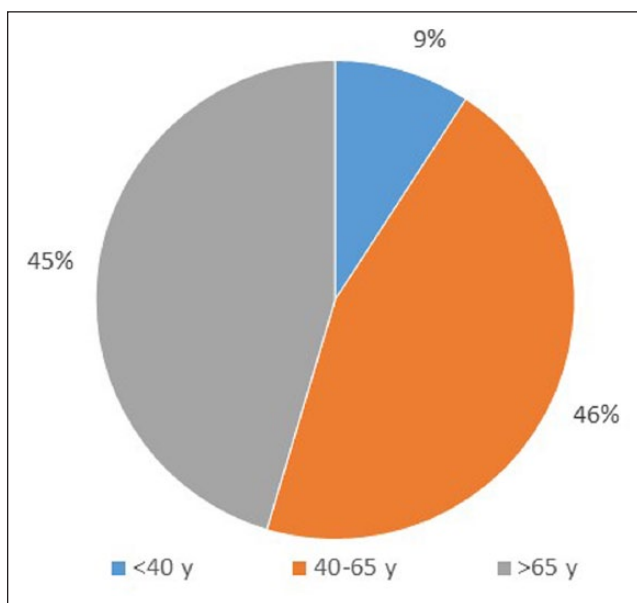


Figure 1. Age distribution of the BPPV patients. The data from the three age groups were pooled together.

adults: <40 years; middle-aged adults: 40–65 years and older adults >65 years.

Young adults

The total number of patients was 16 (7 men and 9 women). A total of 12 patients were affected by the right posterior semicircular canal and 4 by the left-side canal. All patients were treated by repositioning manoeuvre. There were no episodes of recurrent BPPV among this group.

Middle-aged adults

The total number of patients was 79 (18 men and 61 women). In 49 cases, the right ear was involved and in the remaining 30, the left ear. All patients were treated by repositioning manoeuvres, and vestibular rehabilitation therapy was prescribed in 57 of 79 cases (72.1 %). Incidents of recurrent BPPV were observed in seven cases, which were treated by additional repositioning manoeuvres.

Older adults

The total number of patients was 79 (24 men and 55 women). In 52 cases, the right ear was involved and in the remaining 27 cases, the left ear. All patients were treated by repositioning manoeuvres, and vestibular rehabilitation therapy was prescribed in 60 of the 79 cases (75.9%). Incidents of recurrent BPPV were also observed in nine cases, which were treated by repositioning manoeuvres.

The demographical characteristics of the BPPV incidence across the three age groups are reported in Figure 1 (age distribution), Figure 2 (gender) and Figure 3 (laterality of BPPV).

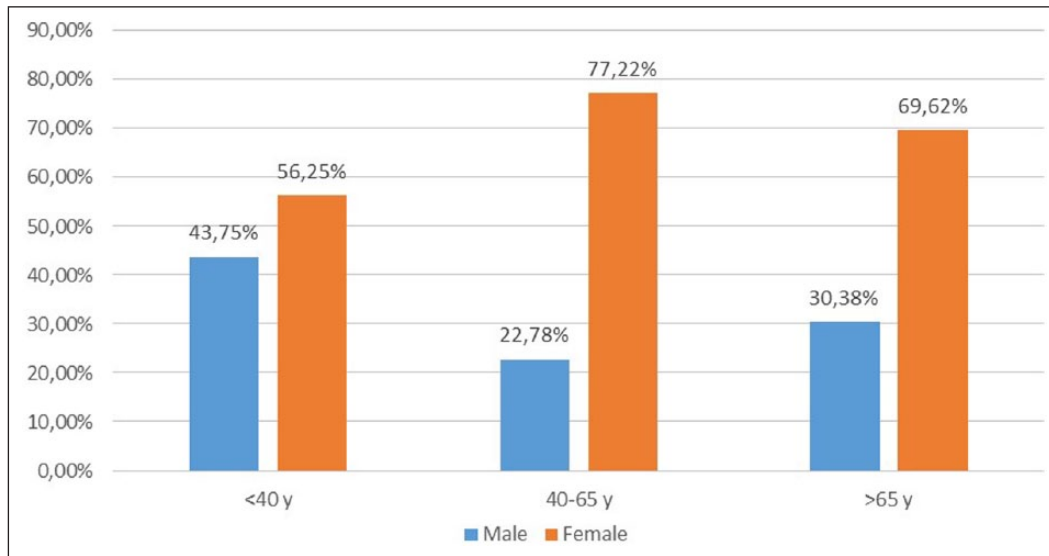


Figure 2. Gender distribution of BPPV incidence, among the three age groups. The male–female incidence differences were found statistically significant, in all three groups.

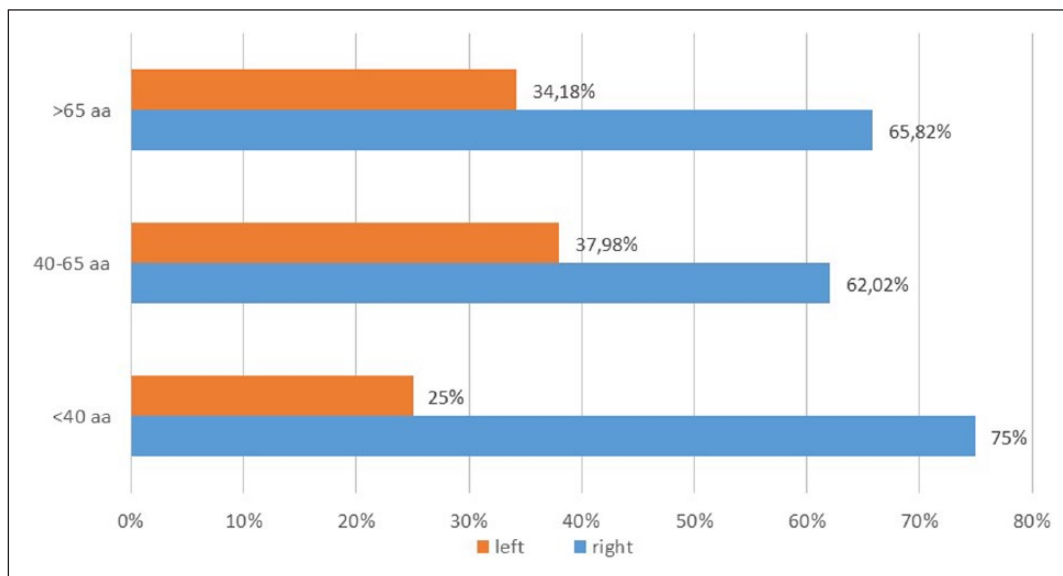


Figure 3. Laterality (left and right ear) distribution of BPPV incidence, across the three age groups. The right–left incidence differences were found statistical significant in all three age groups.

Age distribution. The BPPV incidence was similar for the middle-aged adults (40–65 years) and the older adults (>65 years), with values of 46% and 45%, respectively. The BPPV incidence of the young adults was only 9%, suggesting a probable late-age onset of the disease.

Gender distribution. In all three groups, female subjects showed a higher BPPV incidence than males. The highest gender incidence difference was observed in the middle-aged adults group, where 77.22% of the affected subjects were females ($p < 0.01$). The smallest incidence difference was observed in the group of young adults.

Laterality. Across all three groups, the BPPV incidence was higher in the right ear, but the ratios of the left to the right affected ears were significantly different. The highest difference was observed in the younger adults group (L=25%, R=75%); middle-aged adults (L=37.98%, R=62.02%) and older adults (L=34.18%, R=65.82%) presented similar L/R ear ratios, with the largest difference observed in group 3 ($p < 0.01$).

Discussion

The clinical features of BPPV as described in this study, verify data reported in previous studies and from other

countries. The data from the literature suggest that the posterior canal is the most commonly involved factor in BPPV.^{6,10,12–18}

In particular, the data from our clinical records show that, the posterior semicircular canal BPPV mainly manifests in the period of adulthood (see Figure 1 and the BPPV incidence values of middle-aged adults and older adults); female subjects are more affected; this observation hold true for all three age-related groups. The observed incidences were 56.25% (young adults), 77.21% (middle-aged adults) and 69.62% (older adults). The right ear is mostly affected, suggesting a laterality effect of BPPV.

Adult female subjects seem to be more prone to the occurrence of BPPV, as also reported by previous studies.⁵ It has been reported that female BPPV prevalence could be linked/correlated to hormonal variations, such as menopause and associated demineralization and metabolic changes. The latter condition could reduce bone mineral density, facilitating the detachment of otoconia from the utricular neuroepithelium.⁴ Other studies have considered different factors related to BPPV incidence such as hypertension, hyperlipidaemia, thyroid issues (especially autoimmune thyroiditis), traumas and pathologies of the middle or internal ear, diabetes, gastric ulcer, osteoarthritis, cancer and chronic coronaries or pulmonary pathologies.^{2–6,18}

Concerning the frequent involvement of the right ear, Von Brevern et al.,¹⁹ have reported that most of the assessed patients had the habit of sleeping on their right-head side. This finding is further supported by data in the literature suggesting that the head position during sleep is linked to the side affected by BPPV.^{8,20,21}

Apart from the cases where the BPPV might be caused from a cranial trauma, BPPV is primarily idiopathic, and the causative factors of BPPV have not been identified yet. Previous studies have speculated the possible role of inner ear microvascular impairment in its pathogenesis and the role of cardiovascular risk factors, especially in cases of recurrent BPPV.^{22–24}

The BPPV recurrence is a very interesting topic, in rehabilitation terms. Overall, 9% of the assessed subjects (16/174) in this study presented a BPPV recurrence; there were seven cases from the middle-aged adults and nine cases from the older adults. This estimate is concordant with previous values reported in the literature, ranging from 10%–50% on the average.^{2,3,10} The reported values of BPPV occurrence are rather quite variable considering the number of possible factors contributing to the disease. This calls for additional studies using large data sets spanning a broad age range of subjects.

The repositioning manoeuvres have been found effective in all three groups, well tolerated and most importantly without side effects.

BPPV is among the most frequent forms of vestibular dysfunction in the elderly. Since dizziness is a common medical condition, which has been related to falls in the elderly, it is of great importance to properly recognize BPPV and treat this condition especially in the elderly subjects.^{13–19,21}

In terms of additional research in the future, the results of this study outline some weaknesses. (1) The sample size was estimated by empirical rules (yearly incidence of BPPV) and not by power analysis, thus it might not be optimal for a detailed analysis of BPPV traits. (2) More detailed outcomes (for example, additional details on the factors affecting BPPV incidence) require probably larger data sets. Since the BPPV incidence is not very high, it could be advantageous to collect data across different clinical canter (following the same assessment protocols). (3) It is important to define BPPV outcomes related to the rare cases of lateral and anterior canal. Retrospective studies spanning larger time intervals, can help elucidate this area of research.

Conclusion

The diagnosis of BPPV patients is an easy and quick procedure. The relative treatment is simple, safe and highly effective. BPPV is most prevalent over an age of 40 years and in female subjects. It mainly involves the right posterior semicircular canal. Canalith repositioning manoeuvres are effective, but BPPV recurrence may be observed, especially within the first year.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical approval

Since the present manuscript refers to a retrospective study (the data were extracted from the clinical records in our University clinic), it is not possible to have an ‘a priori’ Institutional Review Board approval.

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Informed consent

At the time of their clinical follow-up, the BPPV patients were informed about a possible use of their clinical data for future studies and submit their consent. The research protocol was conducted in compliance with the Helsinki Declaration (2008). The study did not affect patient care in any way, since only patient data were retrieved and reviewed.

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