Acta Otorrinolaringol Esp. 2011;**62(1):**40–44

Acta Otorrinolaringológica Española

www.elsevier.es/otorrino

ORIGINAL ARTICLE

Benign paroxysmal positional vertigo: analysis of our population and role of caloric tests

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Received April 26, 2010; accepted August 5, 2010

KEYWORDS
Benign paroxysmal positional vertigo;
Caloric tests;
Electrony-stagmography;
Health care costs

Abstract
Introduction and objectives: Benign paroxysmal positional vertigo (BPPV) is the most common cause of vertigo in those patients who seek medical care. Although videonystagmography seems the most indicated diagnostic test, we tried to decrease the requested caloric tests to optimise resources and reduce associated costs.
Methods: We developed a diagnostic-therapeutic algorithm for patients with suspected BPPV whose provocation tests are positive to evaluate the need for caloric testing. We analysed the results of its application on 98 patients who were referred to our Neuro-otology Unit over 15 months requesting videonystagmography and caloric tests.
Results: Only 24% of the requested tests were performed. No significant difference was found in our recurrence rate compared with other series of Spanish patients.
Conclusions: Videonystagmography and caloric tests are not strictly necessary in most patients with BPPV and they should be performed only in patients whose diagnosis is unclear.

PALABRAS CLAVE
Vértigo posicional paroxístico benigno;
Pruebas calóricas;
Electronistagmo-grafía;
Costes sanitarios

Vértigo posicional paroxístico benigno: análisis de nuestra población y del papel de las pruebas calóricas

Resumen
Introducción y objetivos: El vértigo posicional paroxístico benigno (VPPB) es la causa más frecuente de vértigo diagnosticada en los pacientes que buscan asistencia médica. Aunque inicialmente plantear un estudio con videonistagmografía parece lo más indicado, en nuestro medio hemos tratado de disminuir el número de pruebas calóricas solicitadas para optimizar los recursos y disminuir los costes asociados.

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Métodos: Para evaluar la necesidad de realizar pruebas calóricas en estos pacientes, hemos elaborado un algoritmo diagnóstico-terapéutico para enfermos con sospecha de VPPB en los que las pruebas de provocación son positivas y hemos analizado los resultados de su aplicación sobre 98 pacientes que durante 15 meses fueron derivados a nuestra consulta de Otoneurología para que se les realizara una videonistagmografía con estimulación bitérmica binaural.
Resultados: Hemos conseguido reducir las videonistagmografías practicadas a un 24% de las solicitadas. Al comparar nuestro índice de recurrencia tras un año de seguimiento con los de otra serie de pacientes españoles, no hemos obtenido diferencia significativa.
Conclusiones: La videonistagmografía no es estrictamente necesaria en la mayoría de los pacientes con VPPB, debiendo reservarse para los casos de duda diagnóstica.

Introduction

Benign paroxysmal positional vertigo (BPPV) is the most common cause of vertigo in patients seeking medical treatment. Currently, canalithiasis is considered as the pathophysiological theory which best explains how certain head movements are capable of triggering episodes of vertigo. Canalithiasis is the existence of otoconias, probably from the utricle, which have been shifted to the affected semicircular canal and which alter the normal endolymphatic flow which takes place during movement. Clinically, this flow alteration is expressed in most patients as a spinning object sensation lasting seconds or minutes, which is triggered when adopting certain positions.

While the diagnostic suspicion is established by the symptoms, the definitive diagnosis requires verification of the existence of nystagmus, consistent with involvement of semicircular canal after a specific triggering manoeuvre. The most common triggering manoeuvres are the Dix-Hallpike and McClure manoeuvres, which stimulate the posterior and horizontal semicircular canals, respectively. Treatment of BPPV is carried out by repositioning manoeuvres, such as the Epley or the Lempert manoeuvres, which have demonstrated their effectiveness in several studies.[1,2] It can also be treated by auto-replacement exercises, such as those described by Brandt-Daroff.[3]

Although BPPV does not entail a very difficult diagnosis or treatment, its diagnosis is often delayed or not carried out[4] and unnecessary diagnostic tests are often requested.[5] In particular, in recent years, we have observed in our Neurotology Clinic a growing trend by otolaryngologists in our area towards requesting a Videonystagmography (VNG) with bithermal binaural stimulation for patients with suspected BPPV, even before carrying out triggering manoeuvres.

VNG with caloric testing is the gold standard for diagnosis of labyrinthine vertigo; however, it is not a strictly necessary test in the therapeutic management of BPPV. The VNG may be substituted by a direct ocular visualization or with Frenzel glasses, especially in cases where the symptoms prevent the patient from collaborating in conducting this test, preventing the computer record of nystagmus and making necessary a manual review. In addition, VNG can be less reliable than direct eye examination in some cases, since the torsional component of nystagmus that occurs in the posterior semicircular canal involvement may be difficult to interpret.[5]

In order to reduce the number of caloric tests performed, we have designed an algorithm for the management of patients with suspected BPPV. The study of the results of the application of this algorithm in patients who are referred to our clinic is the purpose of this article.

Material and method

We prospectively collected data from patients with suspected BPPV who were referred to our Neurotology Clinic to undergo VNG caloric tests between November 2007 and January 2009. The VNG tests were carried out with an Ulmer device and the caloric tests were performed using air stimulation with a Homoth device. Statistical analysis was performed with SPSS 16.0 for Windows. We obtained the census data necessary for the analysis of our data from the website of the National Statistics Institute.

All patients had previously undergone a basic otoneurological exploration at a first general otolaryngology consultation, as well as a tone audiometry. The diagnosis of BPPV was established in those patients with compatible symptoms and in whom Dix-Hallpike and McClure triggering manoeuvres caused a nystagmus compatible with BPPV. Patients with suspected central vertigo or with cervical spine disorders were automatically excluded from the study.

At this point, we decided to divide the patients into two groups, in order to distinguish those with a higher possibility of their symptoms being caused by a central lesion. The first group, with a low risk of existence of central lesions, consisted of those patients who reported typical symptoms, who presented typical nystagmus showing involvement of the posterior and horizontal semicircular canals and who also showed no significant asymmetries in their audiometries. The second group, with an increased risk of central lesions, was composed of patients with suspected involvement of the superior semicircular canal, with involvement of two canals or with asymmetric audiometries.

We defined "therapeutic failure of repositioning manoeuvres" as the existence of positive triggering

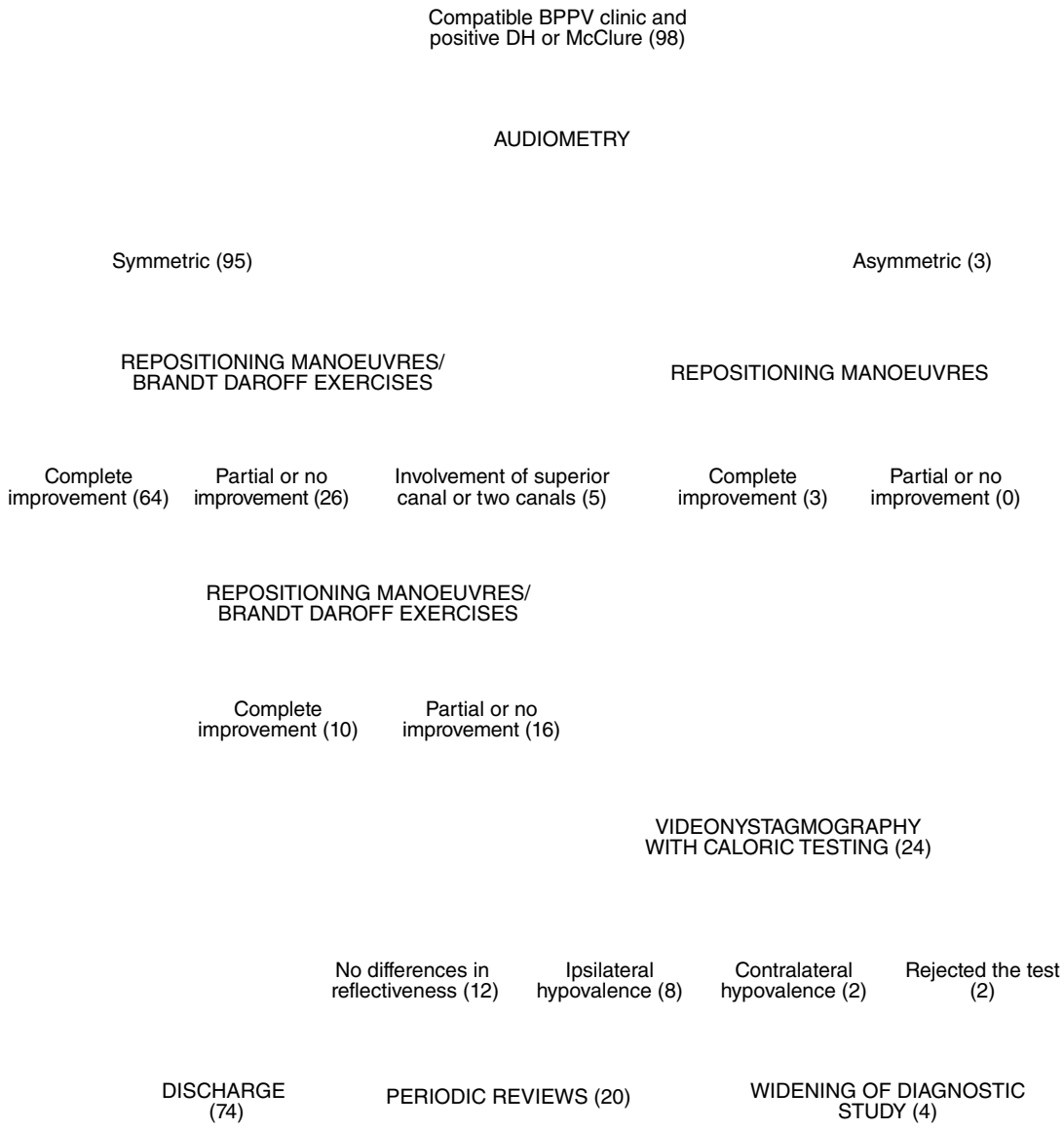

Figure 1 Diagnostic and therapeutic algorithm of our service upon suspicion of BPPV and distribution of the patients in our study. DH: Dix-Hallpike.

manoeuvres, 7 days after carrying out the repositioning manoeuvres. We defined "recurrence of BPPV" as the recurrence of symptoms, 3 months after carrying out therapeutic manoeuvres, with an intermediate asymptomatic period. Lastly, the presence of dizziness without object rotation after repositioning manoeuvres with a negative result of triggering manoeuvres was defined as "residual dizziness".

Our action algorithm is summarized in Figure 1. Alter having established the diagnosis according to our definition (symptoms compatible with positive triggering manoeuvres), we began with an analysis of audiometry.

In cases where the audiometry was asymmetric, we carried out triggering manoeuvres systematically accompanied by caloric tests, since the patients were in the group at a greater risk of central lesions. The objective of VNG in these cases was to study the implication of the inner ear in the symptoms reported by the patient.

In cases with symmetrical audiometry, we carried out triggering manoeuvres. If these were positive, we completed the manoeuvre with specific replacement movements. Patients were reviewed in consultation 7 days after the procedure in order to assess treatment outcomes. If the patients could not tolerate the manoeuvres, they were treated with the Brandt-Daroff exercises and reviewed one month later.

If at this time we detected that the triggering manoeuvres triggered a nystagmus typical of upper channel or of various channels, we carried out repositioning manoeuvres, but the patient was classified in the group at a high risk of central lesion and a VNG was performed in all cases.

When patients reported disappearance of symptoms during the first review, they were discharged with a diagnosis

Table Results of caloric tests carried out on our patients

Result	Absolute value	Relative value
No significant difference of reflectiveness between both ears	12	54.5%
Ipsilateral hyporeflexia	8	36.4%
Contralateral hyporeflexia	2	9.1%
Refusal to carry out test	2	

Figure 2 Number of patients per 100,000 population per year diagnosed with BPPV and referred to our outpatient clinic for completion of VNG, grouped by age.

of BPPV and asked to return for consultation in case of recurrence. If, in this review, patients referred persistence of dizziness, we systematically assumed treatment failure, and therefore we repeated the repositioning manoeuvres and reassessed patients within one week.

In the second review, complete remission of symptoms also involved discharge with a diagnosis of BPPV. However, an incomplete improvement or a persistence of the clinic required us to carry out caloric testing. In these cases, caloric tests showed whether the dizziness symptoms were being caused by BPPV or if there was any other cause of balance alteration. Depending on the results of the VNG, we expanded the diagnostic study with additional tests or reviewed the patient periodically.

All patients were monitored for one year after having carried out the first repositioning manoeuvres.

Results

During the period under review, we received a total of 98 patients who fulfilled the inclusion criteria at our clinic, equivalent to 3.3 patients per 100,000 inhabitants per year. Patients were divided by age as shown in Figure 2, with a maximum peak in the age group of 60 to 69 years. A total of 37.8% of the patients were male and 62.2% were female.

The analysis of tone audiometries showed asymmetries between both ears in 3 patients. This asymmetry consisted in mixed moderate monaural hearing loss in two patients and moderate sensorineural hearing loss at high frequencies in the other patient.

With regard to the affected semicircular canal, 89 (89.8%) patients presented involvement of the posterior semicircular canal, 4 (4.1%) of the horizontal semicircular canal, 3 (3.1%) of the superior semicircular canal and 2 (2%) had simultaneous involvement of two semicircular canals.

According to our definitions, 90 patients (91.8%) belonged to the group at low risk of suffering a central lesion, while 8 patients were in the high-risk group.

Of the 98 patients, 7 of them tolerated the repositioning manoeuvres, so they were treated with Brandt-Daroff exercises. This led to the disappearance of dizziness symptoms in 3 (42.8%) patients, leaving the last one of the three with residual dizziness.

Our recurrence rate between three months and one year after doing carrying out the Epley manoeuvre was 6.4%. Residual dizziness was more frequently found in 22.4% of our population.

Lastly, of the 98 VNG with caloric testing which had been requested, we only carried out 24, which represented a reduction of 76%. The results of these caloric tests are shown in Table. Two patients refused to undergo the test, in order to avoid suffering an episode of vertigo. Among the remaining 22, we found 12 (54.5%) without significant differences in the reflectivity of both areas; 8 (36.3%) with ipsilateral hypovalence to the affected ear and 2 (9.1%) with contralateral hypovalence. This contralateral hypovalence made it necessary to expand the diagnostic study using magnetic resonance imaging with contrast, although this study found no pathological changes in either case.

Discussion

The descriptive data from our population should not be construed as actual values of BPPV incidence. For our analysis, we only collected data from patients who attended our clinic, ignoring those patients with BPPV in our area who were treated by other doctors. We believe that this was the reason why the number of cases we obtained for every 100,000 inhabitants was lower than the incidence of BPPV estimated in transversal studies.[6] However, these descriptive data of our sample have allowed us to compare other variables. Thus, the peak age found in the sixth decade of life and the 2:1 female to male ratio we obtained, both coincided with those described in the literature.[6]

The distribution of the affected semicircular canal in our series has differed significantly from that described in the series of Spanish patients of Molina et al.[7] The main difference between them is that we have detected fewer patients than expected with involvement of the horizontal semicircular canal, which has increased our proportion of posterior canal disease. The incidence of horizontal canal involvement has traditionally been very variable in the published literature, ranging between 5% and 33%. This variability has been attributed to the fact that horizontal canal BPPV may be resolved spontaneously in some cases.[8]

In our series, we only found 4.1% of horizontal canal involvement. If we assume that this low figure is due to a large number of spontaneous resolution, we can deduce that, in general, there is currently a delay in the diagnosis of BPPV in our environment and, therefore, that a greater awareness of the existence of this condition is required by healthcare professionals.

Our recurrence rate three months after performing the Epley manoeuvre was 6.4%, which is statistically similar to the percentage reported in the literature by López-Escámez[9] of 7.5% at 180 days of follow-up. However, if we considered all those patients who required more than one manoeuvre to resolve their symptoms, then our recurrence rate would have risen to 31.6%.

Of our patients, 22.4% reported the disappearance of vertigo symptoms with persistence of residual dizziness. The study by Seok et al[10] described this situation in up to two thirds of patients in whom repositioning treatment was effective. Since the study by Seok concluded that this residual dizziness disappeared in all cases without specific treatment, we decided not to review those patients who presented it.

After studying our case series, we have observed how the application of our diagnostic and therapeutic algorithm reduced the number of caloric tests carried out in relation to those requested, without this implying a significant difference in recurrence rates. Furman et al[11] reported that the results of caloric tests in a population with BPPV showed that there was no difference in reflectance in both ears in most patients, and in 25% of patients there was a hyporeflexia which was ipsilateral to the lesion. These results are consistent with our study with no significant differences, although individuals in the subpopulation on which we performed caloric tests showed a higher risk for central lesions than those from a standard group of patients with BPPV.

Conclusions

1. The low incidence of BPPV-CSH which we found in our population makes us suspect a delay in diagnosis and treatment of BPPV in our environment.
2. The application of our diagnostic algorithm at our Neurotology Unit has represented a 76% reduction in the number of VNG with caloric testing which we would have conducted, but this has not represented a significant increase in the number of relapses.
3. Videonystagmography is not strictly necessary in most patients with BPPV and should be reserved for cases of diagnostic doubt due to the existence of asymmetric hearing impairment, for patients with suspected superior semicircular canal BPPV or BPPV of various semicircular canals and for those who showed no improvement after two or more repositioning manoeuvres.

Conflict of interest

The authors declare no conflict of interest.

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