

Experience With Epley's Manoeuvre and Vestibular Habituation Training in Benign Paroxysmal Positional Vertigo

Francisco Miguel Roa Castro, Luz María Durán de Alba, and Víctor Hugo Roa Castro
Servicio de Otorrinolaringología y Cirugía de Cabeza y Cuello, Hospital Español, México

Introduction: The most frequent vestibular disorder is benign paroxysmal positional vertigo. In almost all patients it occurs spontaneously and mainly through involvement of the posterior semicircular canal. Treatment consists in vestibular habituation training and in canalith repositioning manoeuvres.

Patients and method: A retrospective review of patient files between 1999 to 2001 evaluated those diagnosed as having BPPV due to the posterior semicircular canal in order to compare the response to treatment with vestibular habituation training and with Epley's manoeuvre. The cases are described and analyzed and their response to treatment is compared using Fisher's exact test.

Results: The percentage of success with Epley's manoeuvre was 100%. Eighty-two per cent of patients responded in the first 7 days after the first manoeuvre. Relapses occurred in 17.6%. With vestibular habituation training, a success rate of 90% was obtained in the first month, and this decreased to 80% by the end of the second and third months. Significant differences between the 2 therapeutic modalities were only visible at the conclusion of the first 7 days of treatment ($P=0.01$).

Conclusions: The evident advantage with Epley's manoeuvre is that it greatly reduces the time required to obtain a satisfactory result. In addition, it allows patients to return quickly to their daily activities and improves their quality of life.

Key words: Benign paroxysmal positional vertigo. Epley's manoeuvre. Vestibular habituation training.

Experiencia con la maniobra de Epley y con ejercicios de habituación vestibular en el vértigo posicional paroxístico benigno del canal semicircular posterior

Introducción: El vértigo posicional paroxístico benigno (VPPB) es la alteración vestibular más frecuente. En la mayoría de los pacientes ocurre de manera espontánea y principalmente por afectación del canal semicircular posterior. Su tratamiento consiste en ejercicios de habituación vestibular y en maniobras de reposición canalicular.

Pacientes y método: Se realiza una revisión retrospectiva de expedientes entre 1999 y 2001 para evaluar una serie de pacientes con diagnóstico de VPPB por afección del canal semicircular posterior, teniendo como objetivo comparar los resultados clínicos que se obtienen con la aplicación de la maniobra de Epley y los ejercicios de habituación vestibular. Se analizan descriptivamente los casos y se compara la respuesta al tratamiento mediante prueba exacta de Fisher.

Resultados: En el período revisado se encontró a 27 pacientes. El éxito con la maniobra de Epley fue el 100%. En el 82% de los pacientes ocurrió 7 días tras la aplicación de la primera maniobra. Se observó recidiva en el 17,6%. Con ejercicios de habituación vestibular se obtuvo el 90% de éxito al final del primer mes, aunque disminuyó al 80% para el final del segundo y el tercer mes. Únicamente se demostró diferencia significativa entre las dos modalidades terapéuticas al concluir los primeros 7 días de tratamiento ($p = 0,01$).

Conclusiones: La ventaja evidente de la maniobra de Epley es que reduce de forma importante el tiempo necesario para obtener un resultado satisfactorio, lo que permite al paciente regresar en un tiempo breve a sus actividades cotidianas y que mejore su calidad de vida.

Palabras clave: Vértigo posicional paroxístico benigno. Maniobra de Epley. Ejercicios de habituación vestibular.

The authors have not indicated any conflict of interest.

Correspondence: Dr. F.M. Roa Castro.
Juárez, 3 C. Los Remedios Naucalpan. 53400 México.
E-mail: pacorhoa@hotmail.com

Received July 25, 2007.

Accepted for publication January 24, 2008.

INTRODUCTION

Benign paroxysmal positional vertigo (BPPV) is the most common peripheral vestibular disturbance and is characterized by a brief episode of vertigo, lasting less than

60 seconds, occurring when the position of the patient's head is altered in a particular way with respect to the plane of gravity.¹ Barany described this entity in 1921 and in 1952 it was characterized by Dix and Hallpike.

The frequency of BPPV is difficult to estimate due to the high number of patients with spontaneous remissions, however, it is reported as comprising 10% to 17% of vestibular disorders. While BPPV can occur at any age, it is more common in middle-aged adults and the elderly.²⁻⁴

In most cases, BPPV is spontaneous, but may it may also be associated with head trauma or with infectious or inflammatory processes of the inner ear, or occur after stapedectomy and ischaemia in the territory of the labyrinthine artery.⁵

There is evidence that BPPV in most patients is caused by fragments of calcium carbonate (otoliths) that remain floating in the endolymph of the posterior semicircular canal (SCC) and originating from the degeneration of utricular otoconias, followed in frequency by involvement of the horizontal SCC and, on rare instances, the superior SCC. Occasionally both posterior SCC are affected.⁶⁻⁹

The diagnosis of BPPV is clinical and based on demonstration of nystagmus produced as a result of the involvement of the posterior and superior SCC.¹⁰ The Dix-Hallpike manoeuvre clearly reveals nystagmus resulting from the involvement of posterior and superior SCC. The lateral movement of the head in supine position is the ideal manoeuvre to diagnose the involvement of the horizontal SCC.^{9,11,12}

The classic treatment for BPPV based on vestibular habituation exercises is intended to facilitate the compensation of the central nervous system (CNS) by extinguishing the pathological response to movements of the head, and consists of a series of movements in different positions of the head that cause dizziness and induce tolerance. In recent years, so-called "single manoeuvres" for the treatment of BPPV, which attempt to eliminate particles (probably otoconias) floating freely in the endolymph (canalithiasis) or located in the SCC dome (cupulolithiasis), have gained popularity.^{10,13,14} The Epley manoeuvre is based on the canalithiasis theory and with its therapeutic application a resolution of symptoms on the first manoeuvre is reported in more than 80% of patients, improvement in 10% and recurrence by 30%. The Semont manoeuvre proposed for cases of cupulolithiasis shows positive results in 84% of patients with the first manoeuvre and 92% with a second.^{9,15,16}

This paper presents a series of patients diagnosed with BPPV. The objective was to evaluate the experience and compare the results with the application of the Epley manoeuvre and vestibular habituation exercises. The importance of diagnosis and management of these patients by a medical specialist in otorhinolaryngology is also emphasized.¹⁷

PATIENTS AND METHOD

We reviewed retrospectively the files of patients diagnosed with a condition of BPPV involving the posterior SCC due

to canalithiasis, all treated consecutively in the Spanish Hospital of Mexico's Otorhinolaryngology and Head and Neck Surgery Department, during the period between August 1999 and September 2001. During this period, 27 patients (9 men and 18 women) aged between 40 and 78 years (average age, 56.7 [12.4]) were received. All records included a complete clinical history and otorhinolaryngological examination. For each record, the audiological and otoneurological studies were reviewed, which included pure tone audiometry and impedanciometry. The electronystagmography included recording of optical fixation with the patient sitting, saccadic testing, tracking, and optokinetics. Each patient was thermally tested with water at 30°C and 44°C for each ear. The diagnostic criteria for BPPV were: a) short and recurrent episodes of vertigo caused by changes in the position of the head; b) vertigo and mixed torsional-vertical nystagmus observed during the Dix-Hallpike manoeuvre, presenting latency, maximum duration of 60 s, and fatigue when the manoeuvre was repeated; and c) absence of alterations in the CNS. The Dix-Hallpike manoeuvre was conducted taking the patient from sitting position to lying position with the head at 30 degrees backwards and rotated sideways. The patient was kept in this position for 60 s or until nystagmus disappeared, then brought back to sitting and the manoeuvre was repeated towards the opposite side. Frenzel glasses or videonystagmography can be used, but are certainly not necessary and in this study they were not used.¹³

In each case the patient's age, gender, affected ear, duration of the disorder, the conducting of Epley manoeuvre, and indication of exercises for vestibular habituation were recorded.

The Epley manoeuvre was carried out as follows¹⁵:

1. The patient is taken to the Hallpike position toward the side of symptomatic ear.
2. The head is turned 90° towards the opposite side.
3. Patient is laid on the contralateral side with head in prone position.
4. Transfer to a sitting position with the head still rotated.

Once completed, all patients had a soft collar brace fitted for 48 h and were instructed to sleep in the semi-Fowler position. From the third day until the seventh, they were told to sleep in decubitus position with the unaffected ear downwards. On the seventh day each patient and was examined and the Dix-Hallpike manoeuvre was carried out, repeating the release treatment if it proved positive. Monthly assessments were carried out using the Dix-Hallpike manoeuvre for 3 months.

The exercises of vestibular habituation were indicated according to the generic programme for vestibular rehabilitation proposed by the University of Michigan¹:

- Postural control. Sitting and standing exercises
- Head-eye co-ordination exercises with the patients sitting, consisting of: making lateral movements of the head in progression from slow to fast keeping their gaze fixed on an object; keeping their gaze fixed on an object moving in

step with the patient's head; and keeping the head stable in a visually mobile environment

– Habituation to vertigo exercises consisting of postural manoeuvres: from the sitting position, lying sideways on 1 ear and waiting for 30 s; sitting up then lying down on the opposite ear

These exercises are indicated twice daily for 4 weeks. Patients were clinically evaluated after 48 h, 7 days, and monthly until the third month. The Dix-Hallpike manoeuvre was performed in each review (except after the first 48 h).

The data were analyzed using the STATA 9 programme (StataCorp, Texas, USA) to obtain descriptive statistics, and the results between the 2 therapeutic modalities were compared using Fisher's exact test.

RESULTS

All patients had unilateral involvement (15 right ear and 12 left ear). The cause of BPPV is summarized in Table 1, which notes the predominance of idiopathic BPPV (66.66%), followed by head trauma (11.11%), vestibular neuronitis (7.4%), stapedectomy (7.4%), and vertebrobasilar insufficiency (7.4%). Patients with vertebrobasilar insufficiency were referred by the department of geriatrics, where the diagnosis was made by transcranial Doppler ultrasound, which documented vertebrobasilar artery stenosis. In 17 patients (6 males and 11 females) whose ages ranged between 40 and 78 years (mean, 59.8 [11.8]), Epley's manoeuvre was carried out. The duration of their symptoms ranged from 2 months to 10 years.

We conducted a single Epley manoeuvre in 14 (82%) patients, who remained asymptomatic, and the Dix-Hallpike test carried out on the seventh day was negative (Figure 1). In 3 cases (18%), it was necessary to perform a second manoeuvre 7 days after the first. These patients reported an improvement in their symptoms but presented a positive Dix-Hallpike test, which is why it was deemed necessary to perform Epley's manoeuvre a second time. Of these patients, it was necessary to carry out a third manoeuvre for 2 (12%) at the end of the first month after completing the first Epley canalicular relocation manoeuvre, as both patients reported significant symptomatic improvement, but suffered vertigo with some postural changes as well as giving positive Dix-Hallpike tests (Figure 1). At the conclusion of the second and third month, all 17 patients (100%) produced negative Dix-Hallpike tests (Figure 1).

Relapse occurred in 3 patients (17.3%), and in all cases it occurred in the same ear and in asymptomatic patients, clearly indicating a recurrence, appearing after the third month of monitoring. Of these 3 patients, 2 of them were those who had undergone three Epley manoeuvres, whereas the other patient had had the manoeuvre performed on a single occasion. All patients reported excellent tolerance to the conducting of the manoeuvres, without any need for medication.

Vestibular habituation exercises were indicated for 10 patients (7 women and 3 men) aged 47-69 years (mean, 59.9

Table 1. Aetiology of Benign Paroxysmal Positional Vertigo of the Posterior Semicircular Canal in this Series of Patients

Cause	Patients, n (%)
Idiopathic	18 (66.66)
Due to cranioencephalic trauma	3 (11.11)
Following vestibular neuronitis	2 (7.4)
Prior surgery (stapedectomy)	2 (7.4)
Vertebrobasilar insufficiency	2 (7.4)
Total	27 (100)

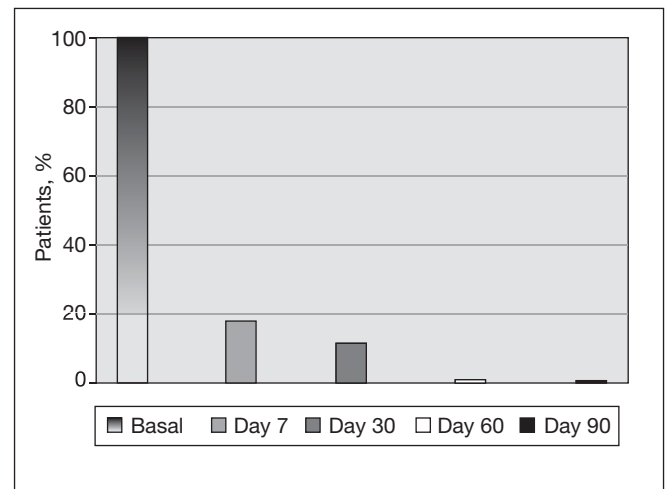


Figure 1. Assessment of patients on whom the Epley manoeuvre was carried out, by the Dix-Hallpike test.

[13.2]). Symptom duration ranged from 2 months to 5 years. At the conclusion of the first 48 hours after initiating vestibular habituation exercises, no patient reported any clinical improvement, which is why the Dix-Hallpike manoeuvre was not carried out. At the seventh day of exercises, only 3 patients referred symptomatic improvement and in the remaining 7 patients the Dix-Hallpike test was positive. At the conclusion of the first month of monitoring, 9 patients were asymptomatic with Dix-Hallpike negative (Figure 2). At the end of the second month, 8 patients remained asymptomatic with Dix-Hallpike negative. The remaining 2 patients admitted failing to carry out the vestibular habituation exercises, a situation that persisted when the patients were reviewed at the end of the third month of monitoring (Figure 2).

When comparing the 2 methods in terms of Dix-Hallpike positivity, significant differences were found only 7 days after the Epley manoeuvre or the beginning of vestibular habituation exercises ($P=.0104$). Subsequently, no significant differences were seen during the evaluation made at the conclusion of the first month of follow-up ($P=.4376$) or at the end of the second and third months of follow-up ($P=.1282$).

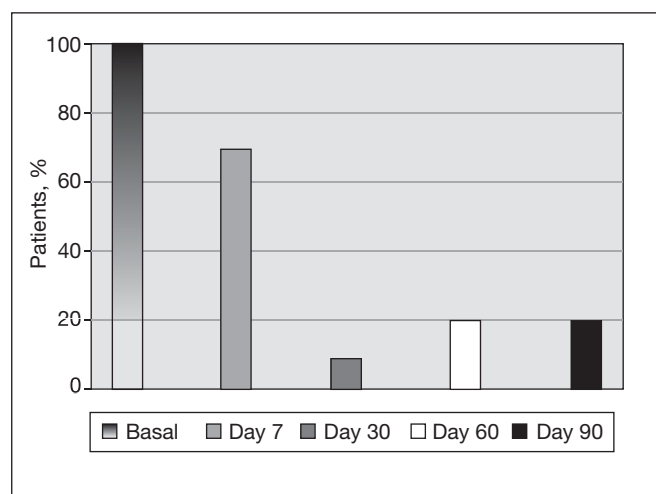


Figure 2. Assessment of patients who were prescribed vestibular habituation exercises, by the Dix-Hallpike test.

Table 2. Results of Treatment of BPPV by Epley's Manoeuvre, Semont's Manoeuvre, and Vestibular Habituation Exercises

Authors	Year	Therapy	Patients, n	Asymptomatic Result, %
Brandt	1980	Exercises	68	98
Semont	1988	Semont	711	93
Norre	1989	Exercises	28	100
Herdman	1990	Exercises	20	60
Uematu	1991	Exercises	51	90
Ciniglio	1992	Semont	65	86
Epley	1992	Epley	30	100
Parnes-Jones	1992	Epley	34	88
Herdman	1993	Epley	30	90
	1993	Semont	30	90
Weider	1994	Epley	44	95
Toledo-Pane	2000	Semont	40	80

DISCUSSION

Single manoeuvres for the treatment of BPPV are aimed at removing particles (probably otoconias) floating freely in the endolymph or located in the SCC dome and are based on physiopathological theories of canalithiasis and cupulolithiasis, respectively. The ENT specialist tries to solve the symptoms of patients immediately by directing these particles out of the SCC towards the utricle by changing the position of the head.^{3,5,18} Moreover, vestibular habituation exercises have proved less effective in the short term than the Epley manoeuvre, as is our case, and that of Semont.^{8,19,20}

There are different opinions in the literature regarding the treatment of BPPV.^{21,22} At our clinic we use Epley's manoeuvre, since it is simple and can be performed in elderly patients. We must also mention that in no case was there poor tolerance to the manoeuvre, which reinforces the idea that the Epley manoeuvre is the initial treatment of choice.^{14,15,23}

Structured programmes of vestibular habituation stimulate the compensation of the CNS. The basic principles of a vestibular habituation programme include exposing the patient to the stimulus which induces vertigo, modifying the deficiencies in postural control, and changing the sedentary lifestyle usually adopted by patients suffering from vestibular disorders.¹ The mechanism of treatment is to disperse the particles floating freely inside the affected semicircular canal. These exercises probably also allow particles attached to the dome to become detached and move towards the otoconia of the utricle²⁴; furthermore, they are based on physiological fatigue due to repetitive motion, with lessening of the intensity of symptoms being achieved in 4 to 8 weeks, thus requiring further consultations to evaluate the results and the patient's consistency in correctly executing the exercises.^{1,16} It is important to note that in our experience, a significant proportion of patients with BPPV have had this disorder for years, since they experience spontaneous remissions or had received various symptomatic treatments, usually prescribed by doctors who were not specialists in otolaryngology. That is why many patients indicate "fear" and sometimes "panic," and are reluctant to perform exercises that may trigger episodes of vertigo.

In this paper, (only) patients who, in addition to referring symptomatic improvement, showed evidence of Dix-Hallpike negative tests were considered as asymptomatic.

The Epley manoeuvre was successful in 100%, a figure published by Epley himself.^{3,10} In 82% of cases (14 patients) it occurred immediately (first manoeuvre). It is estimated that the recurrence of BPPV treated with the Epley manoeuvre varies around 14%-30%; in our series recurrence took place in 3 (17.6%) patients. The relapse occurred after the 3 months required as minimum follow-up time and in all cases it was on the same side. Of the 3 patients who relapsed, the aetiology of vertigo was, respectively, idiopathic, subsequent to head trauma and due to vestibular neuronitis.

In patients who were prescribed vestibular habituation exercises, the success rate was 90% after the first month of treatment and decreased to 80% in the second and third month, due to 2 patients who did not perform the exercises steadily.

Table 2 summarizes the results obtained by various authors in the treatment of BPPV.

The obvious advantage of Epley's manoeuvre is that it significantly reduces the time needed to obtain a satisfactory result when compared with therapy based on vestibular habituation exercises, which allows the patients to return more speedily to their daily activities and improve their quality of life.^{24,25}

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