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Effectiveness of the Epley manoeuvre in posterior canal benign paroxysmal positional vertigo:

a randomised clinical trial in primary care

Abstract

Background
Evidence on the effectiveness of the Epley manoeuvre in primary care is scarce.

Aim
To evaluate effectiveness at 1 week, 1 month, and 1 year of a single Epley manoeuvre versus a sham manoeuvre in primary care.

Design and setting
Multicentre, double-blind randomised controlled trial in two primary care practices in Spain from November 2012 to January 2015.

Method
Patients were ≥18 years diagnosed with subjective or objective posterior benign paroxysmal positional vertigo (vertigo only, or vertigo and nystagmus after a Dix–Hallpike test [DHT]). The intervention group received the Epley manoeuvre, and the control group received a sham manoeuvre. Betahistine was prescribed following the same regimen in both groups. The main outcome measures were the DHT result classified as negative (neither vertigo nor nystagmus) or positive. Positive results were further divided into a positive result for both vertigo and nystagmus (positive DHT with nystagmus), and a positive result for vertigo only (positive DHT without nystagmus); self-reported resolution of vertigo; and self-reported severity of vertigo evaluated on a 10-point Likert scale (10 = worst imaginable vertigo).

Results
In total, 134 patients were randomised to either the intervention group ($n = 66$) or the sham group ($n = 68$). The intervention group showed better results in the unadjusted analyses at 1 week, with a lower rate of positive DHT with nystagmus ($P = 0.022$). A positive baseline DHT with nystagmus was associated with a reduction in vertigo severity (marginal effect for 10-point Likert-like question −1.73, 95% confidence interval [CI] = −2.95 to −0.51) and better positive DHT rates in the intervention group (adjusted odds ratio 0.09, 95% CI = 0.01 to 0.92) in the multivariate analyses.

Conclusion
A single Epley manoeuvre performed in primary care is an effective treatment for reversing a positive DHT and reducing vertigo severity in patients with baseline nystagmus in the DHT.

Keywords
benign paroxysmal positional vertigo; Epley manoeuvre; primary health care; randomised controlled trial.

INTRODUCTION

Vertigo is a common reason for primary care consultation.[1] Benign paroxysmal positional vertigo (BPPV) is the most common type of vertigo and has an estimated lifetime prevalence of 2.4%.[2] Approximately 60% to 90% of cases arise in the posterior canal.[3]

Patients typically describe BPPV as a transient sensation of spinning surroundings. It is a subjective sensation precipitated by changes in head position. BPPV is caused by the migration of otoconia from the utricular macula to the semicircular canals.[3]

The diagnostic test for BPPV is the Dix–Hallpike test (DHT),[4] which is considered positive when it triggers vertigo symptoms and torsional delayed nystagmus. The diagnosis in such cases is objective BPPV. Some authors, however, claim that the triggering of vertigo symptoms without demonstration of nystagmus is sufficient for a diagnosis.[5] Such cases are referred to as subjective BPPV, and they have been estimated to account for between 11.5% and 48% of all cases.[6]

Posterior canal BPPV is treated using canalith repositioning procedures, the most common of which is the Epley manoeuvre (EM).[7] Numerous systematic reviews have shown that this manoeuvre is an effective treatment for posterior canal BPPV and is superior to observation alone.[8]

Little is known about the use of the EM in primary care, even though approximately 60% to 80% of patients with BPPV are first seen by a GP. There have also been reports of suboptimal management of vertigo and BPPV in this setting due to poor awareness[9] and inadequate use of diagnostic and treatment tools.[10–13]

Munoz *et al*[14] reported an improvement in nystagmus (evaluated by the DHT), but not in vertigo symptoms, 1 week after treatment in primary care. There have been calls for further research on BPPV in primary care to guide improvements in overall management.[15]

The aim of this study was to perform a randomised, double-blind, sham-controlled clinical trial to evaluate the effectiveness at 1 week, 1 month, and 1 year of a single EM administered by a GP for the treatment of posterior canal BPPV.

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How this fits in

Benign paroxysmal positional vertigo (BPPV) is the most common type of vertigo, and approximately 60% to 80% of patients with BPPV are first seen by a GP. There have been reports of suboptimal management of BPPV in the primary care setting due to poor awareness and inadequate use of diagnostic and treatment tools. This study shows that a single Epley manoeuvre is an effective treatment for primary care patients with a positive DHT with nystagmus. The manoeuvre, however, was not effective in the subgroup of patients with a positive DHT without nystagmus.

METHOD

Design

This trial, with a published protocol,[16] was conducted in two primary care centres employing 26 GPs providing care for 38 305 people in L'Hospitalet de Llobregat, a city located to the southwest of Barcelona, Spain, from November 2012 to January 2015.

Inclusion and exclusion criteria

Eligible participants included all adults aged ≥18 years, seen at either of the primary care centres, presenting with symptoms consistent with posterior canal BPPV. Those who provided written informed consent to participate in the study and with subsequent DHT confirmation of vertigo with or without nystagmus were included. Patients with pure horizontal nystagmus, or either nystagmus lasting >1 minute, or vertical or alternating nystagmus, were excluded (suspected non-posterior canal BPPVs) and referred to an ear, nose, and throat (ENT) specialist. The full list of exclusion criteria is provided in the study protocol.[16]

Changes to trial design

Although vestibular migraine was not contemplated as an exclusion criterion in the initial trial protocol, growing evidence on the high prevalence of this condition,[17] and its overlapping symptoms with BPPV, alerted the authors to the possibility that patients with vestibular migraine might have been inadvertently enrolled. Thus, on completion of the recruitment and follow-up phases, the authors reassessed all patients and removed those who met the newly defined criteria established for probable vestibular migraine in 2013.[18] These are:

a) At least five episodes with vestibular symptoms of moderate or severe intensity, each lasting 5 minutes to 72 hours.

b) Current or previous history of migraine, with or without aura, according to the International Classification of Headache Disorders (ICHD).

c) One or more migraine features, with at least 50% of the vestibular episodes:
   - headache with at least two of the following characteristics: one-sided location, pulsating quality, moderate or severe pain intensity, or aggravation by routine physical activity;
   - photophobia and phonophobia; and
   - visual aura.

d) Not better accounted for by another vestibular or ICHD diagnosis.

The diagnosis is considered probable when either criteria b or c is fulfilled. The authors therefore removed patients who met criteria a plus b or c.

Intervention

Patients in the intervention group were administered a single EM and prescribed betahistine 8 mg every 8 hours at the baseline visit, and instructed to use the medication as required (maximum three times a day) until improvement of symptoms. Patients in the sham group were prescribed the same regimen of betahistine, but instead of the EM they were administered a sham manoeuvre that consisted of laying the patient with their head turned towards the affected side for 5 minutes.[19]

The GPs responsible for administering the EM took part in a 2-hour practical training session on diagnostic evaluation of vertigo and application of the EM under the supervision of an ENT specialist to ensure consistent execution of the manoeuvre by all those involved. Two videos showing an investigator performing the DHT were also recorded.

Outcome measures

Three outcome measures were evaluated:

1. Response to the DHT. Responses were classified as negative (neither vertigo nor nystagmus) or positive. Positive results were further divided into a positive result for both vertigo and nystagmus (positive DHT with nystagmus), and a positive result for vertigo only (positive DHT without nystagmus).
2. Self-reported resolution of vertigo assessed by a 'yes/no' answer to the question: 'Have you experienced vertigo this week?'

Table 1. Characteristics of the study participants overall and by treatment group

	n	Overall	Sham group (*n* = 68)	Intervention group (*n* = 66)	*P*-value
Median age, years (IQR, Q1–Q3)	134	52.00 (38.25–68.00)	54.00 (40.75–72.00)	50.50 (35.25–64.00)	0.060
Female, *n* (%)	134	102 (76.12)	50 (73.53)	52 (78.79)	0.546
Toxic habits					
Smoking, *n* (%)	134	19 (14.18)	7 (10.29)	12 (18.18)	0.222
Alcohol use, *n* (%)	134	21 (15.67)	10 (14.71)	11 (16.67)	0.815
Drug misuse, *n* (%)	134	3 (2.24)	1 (1.47)	2 (3.03)	0.617
Characteristics of benign paroxysmal positional vertigo					
Vertigo severity (scale, 0–10)	134	7.00 (6.00–8.00)	7.00 (5.75–8.00)	8.00 (6.00–9.00)	0.212
Positive DHT with nystagmus, *n* (%)	134	54 (40.30)	25 (36.76)	29 (43.94)	0.482
Symptom duration, *n* (%)	134				0.328
≤30 days		99 (73.88)	53 (77.94)	46 (69.70)	
>30 days		35 (26.12)	15 (22.06)	20 (30.30)	
Comorbidity					
HBP, *n* (%)	134	34 (25.37)	14 (20.59)	20 (30.30)	0.236
DM, *n* (%)	130	19 (14.62)	9 (13.64)	10 (15.62)	0.807
Anxiety, *n* (%)	130	33 (25.38)	15 (22.73)	18 (28.12)	0.548
Depression, *n* (%)	130	30 (23.08)	15 (22.73)	15 (23.44)	1.000
Head trauma, *n* (%)	134	7 (5.22)	5 (7.35)	2 (3.03)	0.441
Cervical osteoarthritis, *n* (%)	134	22 (16.42)	9 (13.24)	13 (19.70)	0.357
Cervicalgia, *n* (%)	134	64 (47.76)	33 (48.53)	31 (46.97)	0.865
Cardiovascular event, *n* (%)	134	6 (4.48)	2 (2.94)	4 (6.06)	0.437
Viral infection, *n* (%)	134	31 (23.13)	14 (20.59)	17 (25.76)	0.542
Headache, *n* (%)	134	48 (35.82)	22 (32.35)	26 (39.39)	0.472
Dyslipidaemia, *n* (%)	134	57 (42.54)	29 (42.65)	28 (42.42)	1.000
Thyroid disorder, *n* (%)	134	6 (4.48)	1 (1.47)	5 (7.58)	0.113
Osteoporosis, *n* (%)	134	16 (11.94)	8 (11.76)	8 (12.12)	1.000
Use of medication					
Medication for vertigo, *n* (%)	134	78 (58.21)	37 (54.41)	41 (62.12)	0.386
Benzodiazepines, *n* (%)	134	24 (17.91)	11 (16.18)	13 (19.70)	0.656
Antidepressants, *n* (%)	134	27 (20.15)	13 (19.12)	14 (21.21)	0.831
Antihypertensive agents, *n* (%)	133	26 (19.55)	10 (14.71)	16 (24.62)	0.191

DHT = Dix-Hallpike test. DM = diabetes mellitus. HBP = high blood pressure. IQR = interquartile range.

3. Self-reported vertigo severity assessed on a 10-point Likert-type scale ranging from 0 (no dizziness) to 10 (worst imaginable dizziness).

All the outcome variables were assessed at 1-week, 1-month, and 1-year follow-up visits.

Independent variables (Table 1) were obtained from a thorough medical history and medical records, and included demographic information, comorbidities featuring as active diagnoses in the patients' electronic medical records and coded using the ICD-10, medication used to treat vertigo, and other medication of interest.

Recruitment and data collection

Patients with a clinical suspicion of posterior canal BPPV were systematically recruited by GPs at the two participating primary care centres. Those who agreed to participate in the study were referred to one of six GPs on the research team for baseline evaluation. The recruitment period was from November 2012 to January 2015. Figure 1 shows the flow of participants through the study.

Sample size

Based on an α risk of 0.05 and a β risk of 0.2 in a two-tailed test, the sample size calculations determined that 75 patients would be needed in both exposure groups to detect statistically significant differences in clinical recovery rates (reversal of DHT results to negative and self-reported vertigo

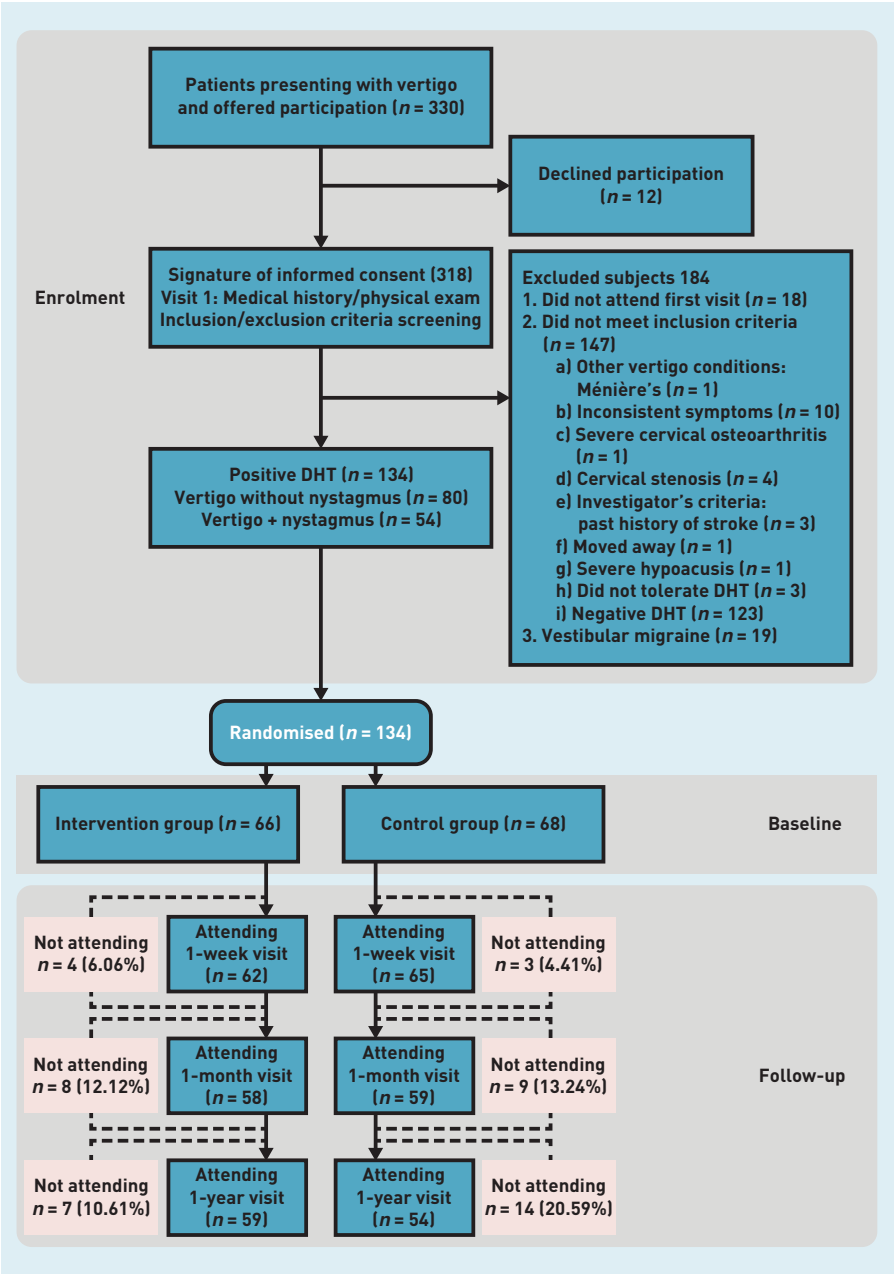


Figure 1. Flowchart of participants. There were no significant differences in baseline characteristics for any of the study variables between the groups (Table 1). DHT = Dix–Hallpike test.

resolution, 30% for the sham group and 55% for the intervention group) and a 1-point improvement in vertigo severity (assuming a standard deviation of 1.9).

A 20% loss to follow-up was assumed. Sample size calculations were performed using the GRANMO software program (version 7.12).

Randomisation

Patients were assigned to the intervention or sham group through random-number generation functions implemented by a third party not involved in the study. The randomisation list was safeguarded by two people not directly involved in the study. Information on group allocation was not specified in the case report forms or database and was accessible only to the external statistician. The GPs responsible for evaluating response at the follow-up visits were different from those who performed the baseline visit and were blinded to treatment allocation.

Statistical analysis

Data were analysed in accordance with the Consolidated Standards of Reporting Trials (CONSORT) guidelines,[20] and comparisons between groups were based on the intention-to-treat principle.

Descriptive statistics were used for all of the study variables, and cross-sectional differences were analysed between the intervention and sham groups using the Wilcoxon test for continuous variables and Fisher's exact test for categorical variables.

Mixed-effects multivariate regression models were used to analyse longitudinal data. Two types of models were used: mixed-effects logistic regression models for dichotomous variables, and mixed-effects Tobit models for vertigo severity due to the limited distribution of this variable. Marginal effects from the logistic regression models were expressed as the exponential of the coefficients, interpretable as odds ratios (ORs), with their corresponding *P*-values. For the Tobit models, the marginal effect (median of the individual marginal effects)[21,22] of the explanatory variables was presented with the statistical significance (*P*-value) of the associated coefficients. The intervention effect was evaluated longitudinally for each outcome variable through the appropriate regression model, without adjustment for confounders. Outcome variables were exclusively explained by the intervention, the follow-up visit, and the interaction between these two factors. The models were run for the overall sample, and for subgroups of patients with and without nystagmus at baseline. Further models were adjusted for confounders. Stepwise backward selection was applied to the aforementioned factors, and their two-way interactions and the best-fit model was chosen according to the Akaike Information Criterion. Predictors were estimated based on significant variables in the final model and expressed as predicted values with 95% confidence intervals (CIs).

The above analyses were more complex than those contemplated in the sample calculation published in the protocol.[16] The authors have therefore reported the statistical power for the most demanding analyses, which were the application of

Table 2. Outcome measures by treatment group at each follow-up evaluation[a,b]

	1-week			1-month			1-year		
	Sham, *n* = 65	Interv, *n* = 62	*P*-value	Sham, *n* = 59	Interv, *n* = 58	*P*-value	Sham, *n* = 54	Interv, *n* = 59	*P*-value
Not interviewed, *n* (%)	3 (4.41)	4 (6.06)	0.716	9 (13.24)	8 (12.12)	1.000	14 (20.59)	7 (10.61)	0.154
Self-reported resolution of baseline vertigo 'Yes', *n* (%)	19 (29.69)	23 (37.10)	0.451	34 (57.63)	36 (64.29)	0.567	41 (75.93)	47 (87.04)	0.215
Positive DHT, *n* (%)	28 (43.08)	22 (36.67)	0.584	20 (34.48)	15 (25.86)	0.419	8 (14.81)	10 (17.86)	0.798
Positive DHT with nystagmus, *n* (%)	14 (21.54)	4 (6.67)	0.022	10 (16.95)	4 (6.78)	0.153	3 (5.66)	5 (10.00)	0.480
Self-reported vertigo severity (Likert scale)	5.00 (2.00–6.00)	3.00 (1.00–5.00)	0.086	2.00 (0.50–4.50)	1.00 (0.00–3.00)	0.100	0.00 (0.00–2.00)	0.00 (0.00–1.00)	0.703

[a]Results are shown as absolute figures and percentages for qualitative variables, and as median and interquartile range for quantitative variables. [b]Positive DHT is vertigo and nystagmus. Global positive DHT is vertigo and nystagmus, or vertigo only. DHT = Dix–Hallpike test. Interv = intervention.

regression models in the lower prevalence subgroups. Statistical analyses were performed in the nlme, lme4, and censReg packages (among others) from the R statistical software (release 3.2.4 revised).

RESULTS

Of the 330 patients initially screened, 153 were randomly allocated to the intervention (*n* = 73) or sham (*n* = 80) group. Following exclusion of 19 patients with probable vestibular migraine, the final sample included 134 patients: 66 in the intervention group and 68 in the sham group. The reasons for exclusion and loss to follow-up are shown in Figure 1.

The results observed at follow-up visits are presented in Table 2.

The intervention group showed better results in the unadjusted analyses at 1 week, with a lower rate of positive DHT with nystagmus (*P* = 0.022). The intervention had a non-significant effect on self-reported vertigo severity at 1 week (*P* = 0.086).

At the 1-week follow-up visit 37.1% of patients reported complete resolution of vertigo, and three times as many controls as intervention patients had a positive DHT with nystagmus result.

The unadjusted results for the longitudinal effects of the intervention based on correlated intraindividual observations for

Table 3. Results of the mixed multivariate regression models adjusted for follow-up visit, intervention group, presence of nystagmus at the baseline visit, and daily use of betahistine, and their interactions[a]

		Global positive DHT[b]		Resolution of baseline vertigo[b]		Likert[c]	
		Odds ratio (95% CI)	*P*-value	Odds ratio (95% CI)	*P*-value	M.Ef (95% CI)	*P*-value
Intercept term	(Reference)	0.259 (0.074 to 0.907)	0.035	0.833 (0.128 to 5.401)	0.848	1.25 (0.20 to 2.16)	0.002
Follow-up visit	Week	Reference	–	Reference	–	Reference	–
	Month	0.760 (0.327 to 1.766)	0.523	5.646 (1.615 to 19.736)	0.007	–0.52 (–1.00 to 0.03)	0.103
	Year	0.305 (0.105 to 0.887)	0.029	21.856 (4.182 to 114.215)	<0.001	–1.83 (–2.74 to -0.93)	<0.001
Treatment group	Control	Reference	–	Reference	–	Reference	–
	Intervention	1.748 (0.435 to 7.033)	0.431	0.508 (0.062 to 4.189)	0.53	0.56 (–0.30 to 1.52)	0.202
Presence of baseline nystagmus		1.296 (0.283 to 5.937)	0.738	2.734 (0.169 to 44.210)	0.479	0.38 (–0.45 to 1.13)	0.433
Daily use of betahistine		1.426 (0.973 to 2.091)	0.069	0.374 (0.158 to 0.889)	0.026	0.66 (0.45 to 0.82)	<0.001
Two-way interactions Group (intervention): Nystagmus	Intervention with baseline nystagmus	0.095 (0.010 to 0.924)	0.043	15.418 (0.583 to 407.714)	0.102	–1.73 (–2.95 to –0.51)	0.011
Nystagmus: betahistine units/d			–	0.313 (0.090 to 1.093)	0.069		

[a]Models obtained from all two-way interactions and three-way interactions interacting with visit and intervention group, and through a variable selection elimination process according to the Akaike Information Criterion. [b]Mixed logistic regression. Results are shown as exponential of the coefficients obtained from the model (expressed as odds ratios except for the intercept term), with a 95% CI estimate and the P*-values reflecting the statistical significance of the corresponding coefficients. [c]Mixed Tobit regression. Marginal effects of the fixed effects of the multivariate mixed Tobit model assuming left censoring at zero and right censoring at 10, with a 95% CI and* P*-value reflecting the statistical significance of the related coefficient. Marginal effect calculated as the median of the individual marginal effects (explained in Cunillera (2014)).[21] M.Ef = marginal effects.*

Figure 2. Probability of a positive response (vertigo and nystagmus or vertigo only) to the DHT, estimated according to the multivariate mixed logistic regression model (shown in Table 3) adjusted for follow-up visit, intervention group, presence of nystagmus at the baseline visit, and daily use of betahistine, and their interactions. DHT = Dix–Hallpike test. Interv = intervention. Nyst = nystagmus.

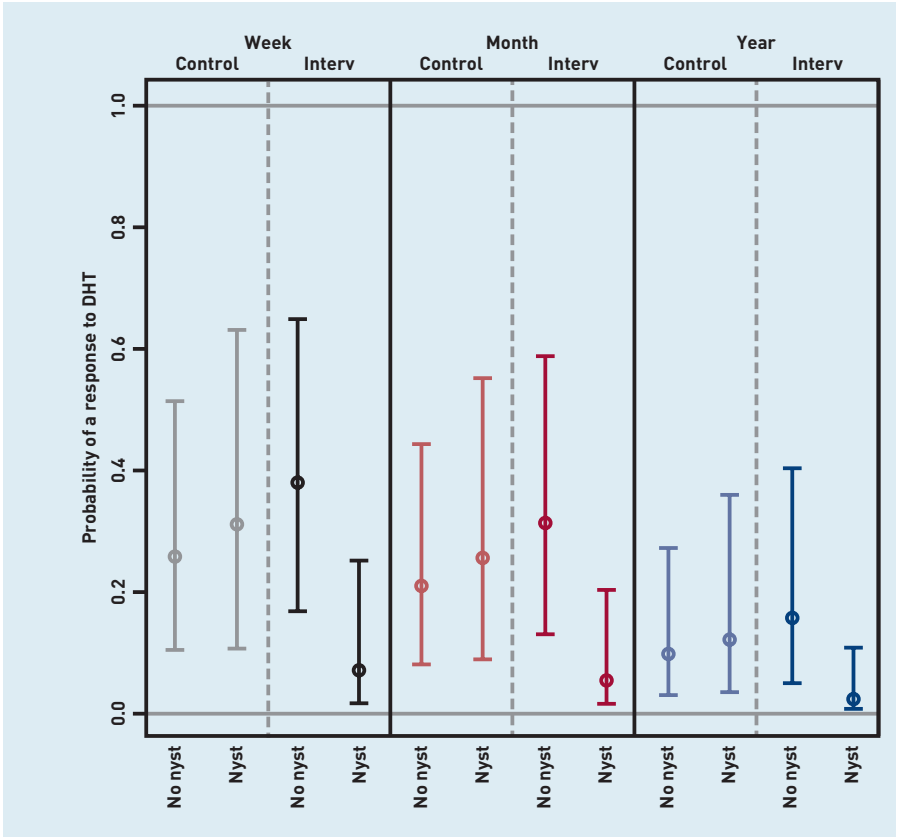
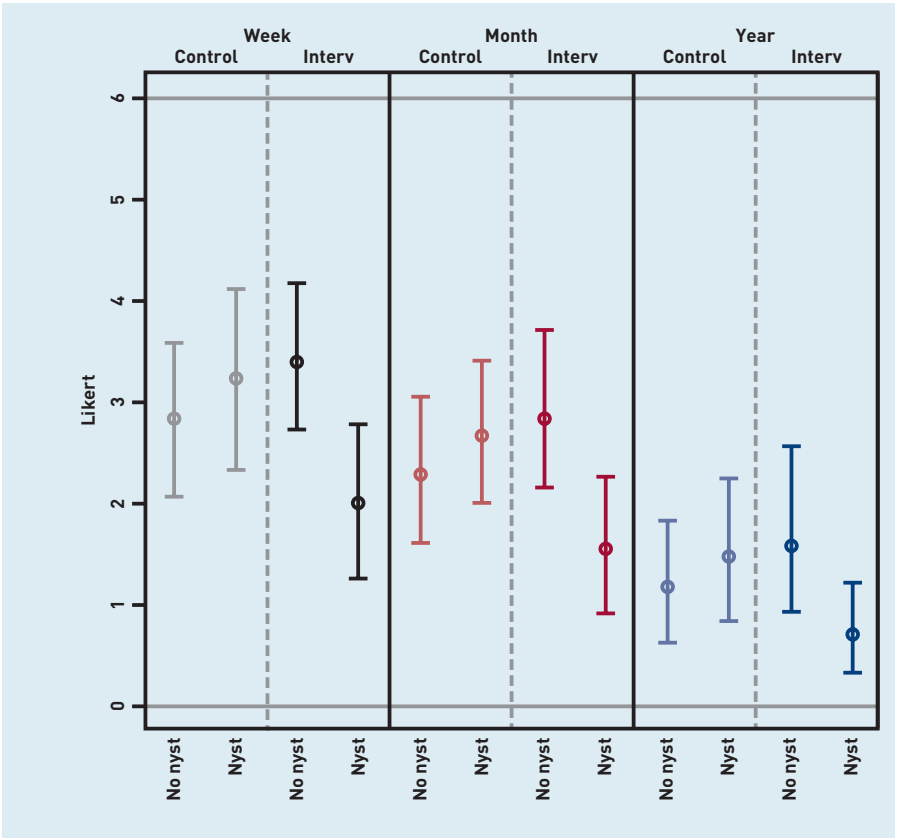


Figure 3. Vertigo severity estimated according to the multivariate mixed regression model shown in Table 3 and adjusted for follow-up visit, intervention group, presence of nystagmus at the baseline visit, and daily use of betahistine, and their interactions. Interv = intervention. Nyst = nystagmus.



the overall sample are available from the authors on request.

In the subgroups stratified by the presence or absence of nystagmus at baseline, a significant overall decrease in positive DHT rates ($P<0.001$) and vertigo severity ($P = 0.003$) associated with the EM was observed in patients with a positive DHT with nystagmus at baseline (available from the authors on request).

The results of the mixed multivariate regression models applied to each outcome measure adjusted for follow-up visit, intervention group, daily use of betahistine, and presence of nystagmus at the baseline visit (and their corresponding interactions) showed better positive DHT results (lower tendency towards a positive response) in patients with a positive baseline DHT with nystagmus in the intervention group (adjusted OR 0.09, 95% CI = 0.01 to 0.92) (Table 3 and Figure 2). There were too few positive DHT with nystagmus cases to apply more complex regression models than those for the unadjusted results, which were already unable to estimate appropriate confidence intervals (further details available from the authors on request).

Finally, the authors observed a reduction in self-reported vertigo severity in patients with a positive DHT with nystagmus at baseline in the intervention group, and this reduction was maintained throughout follow-up (adjusted marginal effect −1.73 (95% CI = −2.95 to −0.51) (Table 3 and Figure 3).

DISCUSSION

Summary

A single EM administered by a GP was an effective treatment for patients with a positive DHT with nystagmus at baseline. Compared with the sham manoeuvre, it was associated with a higher rate of negative DHT responses and an improvement in self-reported vertigo severity. However, no significant differences were observed between the intervention and sham groups when only patients with a positive DHT without nystagmus at baseline were analysed.

Strengths and limitations

The authors' results must be interpreted in light of the limitations and particularities of the study. First, they analysed a significantly higher proportion of patients with a positive DHT without nystagmus than other authors.[6] The authors decided to include these patients to more accurately reflect actual clinical practice as, in their experience, BPPV without nystagmus is much more common in primary care than in ENT settings. This is possibly because in some cases the dislodgement of otoconia may be sufficient to cause vertigo but not to induce nystagmus detectable by a DHT.[6] Less severe cases of BPPV may also be more common in primary care. Another particularity of this study is that nystagmus was evaluated by direct observation and not using Frenzel goggles or videonystagmography, and this may have contributed to some less evident cases being overlooked. The general lack of experience with the DHT among GPs may also have led to cases being missed. The decision to administer betahistine to both groups was an ethical one, as it would have been inappropriate to leave the control group untreated. Both groups, however, were prescribed the same regimen to enable between-group comparisons. Betahistine may have produced a therapeutic effect, similar in the intervention and control groups at baseline. At follow-up, patients were urged to use medication as required until improvement of symptoms, which induced an association of worse symptoms to betahistine intake, thus reducing hypothetical differences between groups. Although multivariate analyses were adjusted by betahistine use and therefore this effect has been attenuated, both facts could have masked the comparative effect of the EM with the sham manoeuvre. A final limitation is that some patients may have worked out which group they were in by looking on the internet.

The main strength of this study is that it is one of the few clinical studies to analyse the effectiveness of the EM for treating BPPV in a primary care setting under routine conditions.

Comparison with existing literature

The authors found no significant difference for resolution of vertigo between intervention patients and controls at the 1-week follow-up visit, supporting findings by Munoz *et al*.[14] This could be because patients continue to experience residual symptoms for some time after treatment. Seok *et al*[23] found that 61% of patients reported residual dizziness after successful repositioning treatment. In the current study, 37.1% of patients reported complete resolution of vertigo at the 1-week follow-up visit. This rate is quite similar to that of 31.6% reported by Munoz *et al*.[14] Froehling *et al*[19] reported a recovery rate of 50% following EM treatment by general internists, although in this case the patients were administered an average of three manoeuvres. Up to four EMs may be

necessary to resolve clinical symptoms.[24]

At the 1-week follow-up visit, three times as many controls as intervention patients had a positive DHT with nystagmus result. This observation is again consistent with findings by Munoz *et al*.[14] The multivariate analyses in the current study confirmed that the EM only led to a significant reversal of positive DHT results in patients with a positive DHT with nystagmus at the baseline visit.

Although the unadjusted analysis did not reveal any significant improvements in vertigo severity in the intervention group, the multivariate analysis showed a significant treatment effect, maintained throughout follow-up, in patients with a positive baseline DHT with nystagmus.

Although some studies have reported a similar effect on symptom resolution in patients treated with the EM regardless of whether they had a positive DHT with or without nystagmus,[9,25] the authors found that the manoeuvre only resulted in significant improvements in DHT responses and vertigo severity in patients with nystagmus. In view of the conflicting results, the authors believe that the decision to treat patients with a positive DHT without nystagmus should be taken at the clinician's discretion, on a case-by-case basis. The EM is a straightforward and safe procedure that can be performed in the office in a matter of minutes, and at virtually no cost. These are all strong arguments in favour of performing the manoeuvre, irrespective of the factors mentioned above.

This study provides evidence that the EM is effective in primary care and may therefore facilitate more frequent use among GPs. Evidence of effectiveness alone, however, is not sufficient. As demonstrated by Gabbay and le May,[26] GPs rarely access formal sources of knowledge (for example, research findings and clinical guidelines) directly. Instead they tend to access (and build) knowledge indirectly, through interactions with colleagues and clinical leaders, and through their experiences and those of others. One recent study of barriers and facilitators to the use of the DHT and EM in emergency departments found that previous negative experiences and forgetting how to perform the procedures contributed to their underuse.[27] The authors of the current study train GPs at their centres. A German group has recently published a study protocol that is going to study the effects of multifaceted training on the management of vertigo in primary care.[28]

Implications for research and practice

The authors believe that by gaining experience with the DHT, GPs will be better able to identify less evident cases of nystagmus, thereby increasing the detection rate of objective BPPV cases who, based on the current findings, are those who truly benefit from treatment with the EM. Although the DHT and EM can increase the duration of a primary care visit by several minutes, their performance offers greater diagnostic accuracy and the opportunity to provide much faster relief to patients than by referring the patient to ENT.

Finally, treatment effectiveness could be improved by repeating the EM where necessary (the EM can be performed three times), and by referring non-responders to the next care level in accordance with established referral criteria.[29]

In future studies, it would be interesting to examine the addition of other diagnostic and therapeutic manoeuvres to routine primary care practice to diagnose less common cases of BPPV, such as lateral or anterior BPPV.

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Ethical approval

The protocol was approved by the Clinical Research Ethics Committee of the Institut Universitari d'Investigació en Atenció Primària Jordi Gol (IDIAP Jordi Gol) on 25 July 2012 (P12/69).

Provenance

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Competing interests

The authors have declared no competing interests.

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