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Otolaryngology -- Head and Neck Surgery 2014 151: 201 originally published online 20 May 2014
DOI: 10.1177/0194599814534940

The online version of this article can be found at:
http://oto.sagepub.com/content/151/2/201
Rapid Systematic Review of the Epley Maneuver versus Vestibular Rehabilitation for Benign Paroxysmal Positional Vertigo

Inge Wegner, MD1,2, Marlien E. F. Niesten, MD1,2, Cornelis H. van Werkhoven, MD3, and Wilko Grolman, MD, PhD1,2

No sponsorships or competing interests have been disclosed for this article.

Abstract

Objective. To evaluate the effectiveness of the Epley maneuver compared with vestibular rehabilitation on patient-reported symptom relief and conversion of the Dix-Hallpike maneuver from positive to negative in patients with posterior benign paroxysmal positional vertigo (p-BPPV).

Data Sources. PubMed, Embase, and the Cochrane Library.

Review Methods. A systematic search was conducted. Studies reporting original study data were included. Relevance and risk of bias (RoB) of the selected articles were assessed. Studies with low relevance, high RoB, or both were excluded. For outcomes of interest, absolute risk differences and their 95% confidence intervals (CIs) were extracted.

Results. A total of 373 unique studies were retrieved. Five of these satisfied the eligibility criteria. One study with low RoB and 3 studies with moderate RoB showed that the Epley maneuver is more effective than vestibular rehabilitation at 1-week follow-up with regard to patient-reported symptom relief and conversion of the Dix-Hallpike maneuver from positive to negative (risk differences range from 10% [95% CI, 30-47] to 55% [95% CI, 35-71]). There is inconsistent evidence for the effectiveness of the Epley maneuver compared with vestibular rehabilitation at 1-month follow-up. Most studies suggest that the Epley maneuver and vestibular rehabilitation are equally effective at 1-month follow-up.

Conclusion. The Epley maneuver is more effective in treating p-BPPV than vestibular rehabilitation at 1-week follow-up. There is inconsistent evidence for the effectiveness of the Epley maneuver compared with vestibular rehabilitation at 1-month follow-up.

Keywords

BPPV, vertigo, vestibular therapy, rehabilitation therapy, CRP, Epley, systematic review

Background

Benign paroxysmal positional vertigo (BPPV) is the most common cause of vertigo worldwide. Between 17% and 42% of patients with vertigo are diagnosed with BPPV,1-3 and the lifetime prevalence is 2.4%.4 BPPV is characterized by repeated episodes of spinning sensations induced by changes in head position relative to gravity. The onset of vertigo attacks is sudden, and the attacks are usually accompanied by imbalance, nausea, and torsional nystagmus. BPPV is thought to be caused by debris in the semicircular canals. Most commonly, the posterior canal is affected in approximately 85% to 95% of cases.3 Calcium carbonate crystals (otoliths) from the utricle fall into the lumen of the posterior canal, where they move freely and cause vertigo when the position of the head is changed. An episode of posterior canal BPPV (p-BPPV) can be provoked by performing the Dix-Hallpike maneuver.

There are numerous treatment options for p-BPPV. Canalith repositioning maneuvers, such as the Epley maneuver, and vestibular rehabilitation, including Brandt-Daroff exercises, are the main treatment options. Canalith repositioning maneuvers aim to move the debris from the posterior semicircular canal to the vestibule, thereby relieving the stimulus from the semicircular canal.5,6 Brandt-Daroff exercises are repositioning exercises performed at home that work in a similar way.7 Vestibular rehabilitation may also include a combination of habituation exercises, stabilization exercises, fall prevention training, and education.8,9

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The aim of this systematic review is to evaluate the effectiveness of vestibular rehabilitation in comparison with the Epley maneuver in relieving symptoms of p-BPPV.

Methods
A rapid systematic review of the available evidence was performed. Whereas traditional systematic reviews typically take a minimum of 6 months to 1 year to complete, a rapid review accelerates the process while maintaining a systematic approach.

Retrieving Studies
A systematic search in PubMed, Embase, and the Cochrane Library was conducted with assistance of a clinical librarian (date of last search was March 6, 2014). Relevant synonyms for the search terms BPPV, vestibular rehabilitation, and Epley were combined (see Table 1). Two assessors (I.W. and M.E.F.N.) excluded duplicate titles and independently screened the title and abstract of the retrieved records for inclusion. Studies on p-BPPV that compared the effect of vestibular rehabilitation to the Epley maneuver were included. Only reports of original study data were included; systematic reviews, animal or laboratory studies, opinion papers, poster presentations, and case reports were excluded (see Figure 1 for selection criteria). The same 2 reviewers (I.W. and M.E.F.N.) screened the full texts of eligible articles using the same inclusion and exclusion criteria. Related publications that were not identified by the initial literature search were searched in PubMed and Scopus. Selected articles, related reviews, meta-analyses, and guidelines were hand searched for relevant cross-references.

Assessing Studies
Using predefined criteria, 2 reviewers (I.W. and M.E.F.N.) independently assessed the selected studies for their relevance and risk of bias (see Table 2 for assessment criteria). Relevance concerned the applicability of the study findings for answering the clinical question and involved the patient domain, treatments, and outcomes that were studied. When an item of the study assessment was reported, it was classified as either “satisfactory” or “unsatisfactory.” When an item was not reported, it was rated “unclear.” Studies were classified as having high, moderate, or low relevance if they complied with all 3, 2, or 1 of these criteria, respectively.

The Cochrane Library

<table>
<thead>
<tr>
<th>Database</th>
<th>Search</th>
<th>Hits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PubMed</td>
<td>(BPPV:ti,ab OR BPV:ti,ab OR BPNN:ti,ab OR BPN:ti,ab OR ((positional:ti,ab OR positioning:ti,ab OR postural:ti,ab OR paroxysmal:ti,ab OR paroxistic:ti,ab OR recurrent:ti,ab)) AND (vertigo:ti,ab OR nystagmus:ti,ab OR dizziness:ti,ab OR disorder:ti,ab OR disorders:ti,ab)) OR cupulolithiasis:ti,ab OR canalolithiasis:ti,ab OR canalithiasis:ti,ab OR “benign paroxysmal positional vertigo”[Supplementary Concept] AND (rehabilitat*:ti,ab OR habituat*:ti,ab OR ((vestibular:ti,ab OR physical:ti,ab OR balanc*:ti,ab) AND (therapy:ti,ab OR therapies:ti,ab OR retraining:ti,ab OR training:ti,ab)) OR physiotherapy:ti,ab OR “physical therapy modalities”[mesh] OR Brandt:ti,ab OR Daroff:ti,ab) AND (CRP:ti,ab OR Epley:ti,ab OR reposition*:ti,ab OR liberatory:ti,ab OR bedside:ti,ab OR manoeuvre*:ti,ab OR manoeuv*:ti,ab)]</td>
<td>262</td>
</tr>
<tr>
<td>Embase</td>
<td>(BPPV:ti,ab OR BPV:ti,ab OR BPNN:ti,ab OR BPN:ti,ab OR ((positional:ti,ab OR positioning:ti,ab OR postural:ti,ab OR paroxysmal:ti,ab OR paroxistic:ti,ab OR recurrent:ti,ab)) AND (vertigo:ti,ab OR nystagmus:ti,ab OR dizziness:ti,ab OR disorder:ti,ab OR disorders:ti,ab)) OR cupulolithiasis:ti,ab OR canalolithiasis:ti,ab OR canalithiasis:ti,ab OR “benign paroxysmal positional vertigo”[exp] AND (rehabilitat*:ti,ab OR habituat*:ti,ab OR ((vestibular:ti,ab OR physical:ti,ab OR balanc*:ti,ab) AND (therapy:ti,ab OR therapies:ti,ab OR retraining:ti,ab OR training:ti,ab)) OR physiotherapy:ti,ab OR “physical therapy modalities”[exp] OR Brandt:ti,ab OR Daroff:ti,ab) AND (CRP:ti,ab OR Epley:ti,ab OR reposition*:ti,ab OR liberatory:ti,ab OR bedside:ti,ab OR manoeuvre*:ti,ab OR manoeuv*:ti,ab)</td>
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</tr>
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<td>The Cochrane Library</td>
<td>(BPPV OR BPV OR BPNN OR BPN OR (positional OR positioning OR postural OR paroxysmal OR paroxistic OR recurrent) AND (vertigo OR nystagmus OR dizziness OR disorder OR disorders)) OR cupulolithiasis OR canalithiasis OR canalolithiasis AND (rehabilitat* OR habituat* OR ((vestibular OR physical OR balanc*)) AND (therapy OR therapies OR retraining OR training)) OR physiotherapy OR Brandt OR Daroff) AND (CRP OR Epley OR reposition* OR liberatory OR bedside OR manoeuvre* OR manoeuv*):ti,ab,kw</td>
<td>42</td>
</tr>
</tbody>
</table>
the use of an intention-to-treat analysis. Studies were classified as having a low risk of bias if they satisfied all of these criteria, moderate risk of bias if they satisfied at least 4 criteria, and the remainder was classified as high risk of bias. Initial discrepancies between independent reviewers were resolved by discussion, and reported results are based on full consensus. Studies with low relevance, high risk of bias, or both were excluded from further review.

Data Extraction
For the included studies, 2 authors (I.W. and M.E.F.N.) independently extracted descriptive data of patients and interventions. For the outcomes of interest, absolute risk differences were extracted and their 95% confidence intervals (95% CIs) were calculated. If these were not given or could not be recalculated, the findings as reported in the article were presented.

Results
Retrieving Studies
A total of 578 titles were retrieved, of which 373 were unique studies (see Figure 1). One paper was excluded based on language (Chinese). Nine articles were initially considered eligible for answering our clinical question following title and abstract and subsequent full-text screening. Cross-reference checking revealed no additional articles.

Assessing Studies
The relevance was found to be high for all 9 included studies (see Table 2). The risk of bias was low in only 1 study, moderate in 4 studies, and high in the remaining 4 studies. Randomization, concealed treatment allocation, and blinding were either not achieved, inadequate, or no information was provided regarding these criteria in most of the included studies. For 3 studies, a large amount of outcome data was missing, and in none of these studies was an intention-to-treat analysis carried out. Five studies with low to moderate risk of bias were included for further review. The study reported by Amor-Dorado et al failed none of the risk of bias criteria. Therefore, we put the most trust in the data presented in this study.

Study Descriptives
The selected studies included a total of 258 patients with p-BPPV (see Table 3). In all studies, patients were included if they presented with symptoms of recurrent vertigo and a characteristic torsional nystagmus when performing the Dix-Hallpike maneuver. Patients with central nervous system disorders were excluded in all studies. The study populations were similar with regard to age (mean age ranged from 55 to 60 years). There are major dissimilarities between studies regarding type of Epley maneuver, type of vestibular rehabilitation, follow-up duration, and outcome measures. The modified Epley maneuver was compared with Brandt-Daroff exercises in 3 studies. In 1 study, the modified Epley maneuver was compared with the rolling-over maneuver, and in 2 studies, the Epley maneuver was compared with vestibular habituation exercises. Cohen and Kimball instructed their patients to perform 4 exercises 4 times a day: nodding the head up and down, shaking the head right and left, rolling the head, and...
Table 2. Assessment of Studies on the Effect of Vestibular Rehabilitation versus the Epley Maneuver for Benign Paroxysmal Positional Vertigo.a

<table>
<thead>
<tr>
<th>Study (Year)</th>
<th>Study Design</th>
<th>Patients</th>
<th>Treatment</th>
<th>Outcome</th>
<th>Randomization</th>
<th>Concealed allocation</th>
<th>Blinding</th>
<th>Standardization (T)</th>
<th>Standardization (O)</th>
<th>Complete Data</th>
<th>Intention to Treat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amor-Dorado et al (2012)11</td>
<td>RCT</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>○</td>
<td>○</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cohen and Kimball (2005)12</td>
<td>RCT</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>○</td>
<td>○</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roa Castro et al (2008)14</td>
<td>RCS</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radtke et al (1999)15</td>
<td>PCS</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Karanjai and Saha (2010)16</td>
<td>PCS</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steenerson and Cronin (1996)17</td>
<td>PCS</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soto Varela et al (2001)18</td>
<td>PCS</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

aStudy design: PCS = prospective cohort study; RCS = retrospective cohort study; RCT = randomized controlled trial; ? = unclear, no information provided. Patients: ● = patients with posterior benign positional paroxysmal vertigo (p-BPPV); ○ = patients with horizontal, anterior, or combined BPPV. Other. Treatment: ● = vestibular rehabilitation therapy versus the Epley maneuver for p-BPPV. ○ = other. Outcome: ● = subjective recovery of nystagmus upon performing the Dix-Hallpike maneuver; ○ = other. Randomization: ● = adequate randomization (eg, random number table or coin toss); ○ = no adequate randomization. Concealed allocation: ● = adequate concealment of treatment allocation (eg, sealed, opaque envelopes); ○ = no adequate concealment. Blinding: ● = outcome assessors were blinded for treatment allocation; ○ = outcome assessors were not blinded for treatment allocation. Standardization (T) of treatment: ● = yes, vestibular rehabilitation and the Epley maneuver were performed by the same person in all cases or operating procedures were protocolized; ○ = no. Standardization (O) of outcome: ● = yes, outcome was assessed by the same outcome assessor in all cases and at a standardized follow-up moment; ○ = no. Completeness of outcome data for primary outcome: ● = below 10% nonselective missing data; ○ = 10% or more missing data and/or missing data was selective. Intention-to-treat analysis: ● = an intention-to-treat analysis was performed; ○ = patients were not analyzed according to intention to treat.

The extracted outcome data of the 5 included studies are described in Table 3. Risk differences are positive when results favor the Epley maneuver and negative when they favor vestibular rehabilitation. In the study performed by Amor-Dorado et al,11 the difference in conversion of the Dix-Hallpike maneuver was in favor of the modified Epley maneuver after 1 week of follow-up, with a risk difference (RD) of 55% (95% CI, 35 to 71). Three studies12,14,15 reported success percentages at short-term follow-up of 1 week or less in favor of the (modified) Epley maneuver. In 1 of these studies,12 which had 2 comparator groups, conversion of the Dix-Hallpike maneuver was evaluated. This study showed an RD in favor of the Epley maneuver of 47% (95% CI, 19 to 67) and 55% (95% CI, 28 to 73), respectively. In another of these studies,15 patient-reported symptom relief was evaluated (RD of 41% [15 to 62] in favor of the Epley maneuver). In the remaining study,14 the combined results of the Dix-Hallpike maneuver and patient-reported symptom relief were evaluated (RD of 52% [95% CI, 13 to 78] in favor of the Epley maneuver). In 1 of the studies,13 no difference was found between the 2 treatment groups with regard to circumducting the head clockwise and counterclockwise. Habituation therapy included postural control, head-eye coordination, and habituation to vertigo exercises in the study performed by Roa Castro et al.14 Three of the included studies11,13,14 performed follow-up at both 1 week and 1 month. One study15 performed follow-up at 1 week only and 1 study at 1 month only.13 Three studies11-13 reported success rates in terms of conversion of the Dix-Hallpike maneuver from positive to negative. Patient-reported symptom relief was reported in 3 studies.12,13,15 In the study performed by Roa Castro et al,14 the results of the Dix-Hallpike maneuver and patient-reported symptom relief were combined.

Data Extraction

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conversion of the Dix-Hallpike maneuver (10% [95% CI, –30 to 47]) and patient-reported symptom relief (–2% [95% CI, –39 to 37]) at 1-week follow-up.

Four studies\textsuperscript{11-14} reported the effect of the (modified) Epley maneuver versus vestibular rehabilitation at 1-month follow-up. Amor-Dorado et al\textsuperscript{11} reported a statistically significant RD of 50% (95% CI, 31 to 65) in favor of the Epley maneuver with regard to conversion of the Dix-Hallpike maneuver. Cohen and Kimball,\textsuperscript{12} whose study had 2 comparator groups, found a statistically significant and clinically relevant difference in favor of habituation exercises for complete symptom relief at 1-month follow-up (RD of –35% [95% CI, –62 to –2]) compared with the Epley maneuver. The other 3 studies\textsuperscript{12-14} did not show a difference in the effectiveness of the Epley maneuver compared with vestibular rehabilitation; the results of these studies are not statistically significant, as the confidence intervals contain zero. More specifically, these studies showed no difference in effectiveness of the Epley maneuver compared with Brandt-Daroff exercises\textsuperscript{12} (RD of 16% [95% CI, –14 to 43] for Dix-Hallpike conversion and RD of –20% [95% CI, –48 to 12] for patient-reported symptom relief), habituation exercises (RD of 6% [95% CI, –24 to 34] for Dix-Hallpike conversion\textsuperscript{12} and RD of –2% [95% CI, –26 to 28] for the combination of Dix-Hallpike conversion and patient-reported symptom relief\textsuperscript{14}) or the rolling-over maneuver\textsuperscript{13} (RD of –25% [95% CI, –49 to 8] for Dix-Hallpike conversion and RD of –17% [95% CI, –40 to 14] for patient-reported symptom relief).\textsuperscript{4}

\textbf{Discussion}

There is evidence from 1 study\textsuperscript{11} with low risk of bias and 3 studies\textsuperscript{12,14,15} with moderate risk of bias that the (modified) Epley maneuver is more effective than vestibular rehabilitation at short-term follow-up of 1 week or less with regard to patient-reported symptom relief and conversion of the Dix-Hallpike maneuver from positive to negative. There is inconsistent evidence from 4 studies\textsuperscript{11-14} regarding the effectiveness of the (modified) Epley maneuver compared with vestibular rehabilitation at 1-month follow-up. Two studies\textsuperscript{11,12} show a statistically significant RD of 50% (31 to 65) in favor of the Epley maneuver and an RD of –35% (–62 to –2) in favor of habituation exercises, respectively.\textsuperscript{12} Another 3 studies\textsuperscript{12-14} did not show a (statistically significant) difference between the 2 study groups.

Spontaneous resolution of symptoms at 1 month occurs in 20% to 80% of patients with BPPV.\textsuperscript{3} It is likely that symptoms resolve in patients with BPPV in a 1-month time frame irrespective of treatment. Therefore, longer time intervals between diagnosis and treatment assessment may lead to overestimation of treatment effects. Furthermore, this might explain why there is no consistent evidence for the effectiveness of the 2 therapy groups at 1-month follow-up.

Table 3. Results of Studies on the Effect of Vestibular Rehabilitation versus the Epley Maneuver for Benign Paroxysmal Positional Vertigo.\textsuperscript{a}

<table>
<thead>
<tr>
<th>Study (Year)</th>
<th>Treatment Group 1 (n)</th>
<th>Treatment Group 2 (n)</th>
<th>Outcome Measure</th>
<th>Follow-up Duration</th>
<th>Treatment Group 1</th>
<th>Treatment Group 2</th>
<th>Absolute Risk Difference (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amor-Dorado (2012)\textsuperscript{11}</td>
<td>Modified Epley maneuver (41)</td>
<td>Brandt-Daroff exercises (40)</td>
<td>Dix-Hallpike (%)</td>
<td>I week</td>
<td>80</td>
<td>25</td>
<td>55 (35 to 71)</td>
</tr>
<tr>
<td>Cohen and Kimball (2005)\textsuperscript{12}</td>
<td>Modified Epley maneuver (24/17\textsuperscript{b})</td>
<td>Brandt-Daroff exercises (25/20\textsuperscript{b})</td>
<td>Complete symptom relief (%)</td>
<td>I month</td>
<td>93</td>
<td>43</td>
<td>50 (31 to 65)</td>
</tr>
<tr>
<td>Sugita-Kitajima et al (2010)\textsuperscript{13}</td>
<td>Modified Epley maneuver (12)</td>
<td>Rolling-over maneuver (10)</td>
<td>Complete symptom relief (%)</td>
<td>Immediately</td>
<td>21</td>
<td>12</td>
<td>9 (–13 to 29)</td>
</tr>
<tr>
<td>Roa Castro et al (2008)\textsuperscript{14}</td>
<td>Epley maneuver (17)</td>
<td>Habituation exercises (10)</td>
<td>Asymptomatic and negative Dix-Hallpike (%)</td>
<td>I month</td>
<td>76</td>
<td>60</td>
<td>16 (–14 to 43)</td>
</tr>
<tr>
<td>Radtke et al (1999)\textsuperscript{15}</td>
<td>Modified Epley maneuver (28)</td>
<td>Brandt-Daroff exercises (26)</td>
<td>Dix-Hallpike (%)</td>
<td>I week</td>
<td>64</td>
<td>23</td>
<td>41 (15 to 62)</td>
</tr>
</tbody>
</table>

\textsuperscript{a}n = number of patients; 95% CI = 95% confidence interval. A positive absolute risk difference favors treatment group 1 (the [modified] Epley maneuver).

\textsuperscript{b}In the study performed by Cohen and Kimball,\textsuperscript{12} some patients did not return for the 1-month follow-up: 17, 20, and 17 patients did return at 1 month in the modified Epley, Brandt-Daroff, and habitation groups, respectively.
Some limitations of the available evidence need to be considered. First, only 1 study\textsuperscript{11} satisfied all of the risk of bias criteria. In the other 4 included studies,\textsuperscript{12-15} adequate randomization, concealed allocation, and blinding was not achieved or not described or a large amount of outcome data was missing. A consequent high risk of selection bias might lead to overestimation or underestimation of treatment effects. Second, the included studies varied with respect to type of Epley maneuver, type of vestibular rehabilitation, follow-up duration, and outcome measure. The heterogeneity in study characteristics made us decide to refrain from pooling the available data. Third, the sample sizes were rather small, yielding wide confidence intervals.

Both the (modified) Epley maneuver and vestibular rehabilitation are associated with mild adverse events. Nausea, vomiting, fatigue, neck pain, and conversion to horizontal canal BPPV have been reported.\textsuperscript{6,21} In the study performed by Amor-Dorado et al,\textsuperscript{11} nausea and/or vomiting was reported in 32\% of patients treated with the Epley maneuver and 22\% of patients treated with Brandt-Daroff exercises. Nine patients treated with Brand-Daroff exercises in this study were switched to the Epley maneuver at 1-month follow-up because of lack of improvement and persistence of vertigo. In the study performed by Radtke et al,\textsuperscript{15} 14\% of patients treated with the modified Epley maneuver experienced nausea compared with 38\% in the Brandt-Daroff group. One patient who was treated with the modified Epley maneuver in this study complained of neck pain, and 1 patient complained of Brandt-Daroff exercise-related fatigue.

**Conclusion and Recommendation**

There is moderate-quality evidence that the Epley maneuver is more effective in treating p-BPPV than vestibular rehabilitation with regard to patient-reported symptom relief and conversion of the Dix-Hallpike maneuver from positive to negative at 1-week follow-up. There is inconsistent evidence for the effectiveness of the Epley maneuver compared with vestibular rehabilitation at 1-month follow-up. Most studies suggest that the Epley maneuver and vestibular rehabilitation are equally effective at 1-month follow-up. However, the only study with a low risk of bias did show a difference of 50\% (31 to 65) in favor of the Epley maneuver with regard to conversion of the Dix-Hallpike maneuver. Another study found a difference in favor of habituation exercises for complete symptom relief at 1-month follow-up (~35\% [-62 to -2]) compared with the Epley maneuver. We would recommend treating patients with the Epley maneuver. We would consider vestibular rehabilitation in patients who do not tolerate the Epley maneuver or who do not respond to treatment with the Epley maneuver.

**Acknowledgments**

We acknowledge and thank the following medical students for their contribution to this systematic review: K. M. Blok, S. M. Egger, A. V. Jong Tjen Fa, J. C. L. Notohardjo, and G. M. de Veij Mestdagh. We thank B. M. R. Kramer, PhD, information specialist health and medical sciences at Utrecht University Library, for her help with setting up and conducting the search strategy.

**Author Contributions**

Inge Wegner, writing, data collection, data analysis, interpretation, drafting and revision, approval of final version; Marlien E. F. Niessen, writing, data collection, data analysis, interpretation, drafting and revision, approval of final version; Cornelis H. van Werkhoven, data analysis, interpretation, drafting and revision, approval of final version; Wilko Grolman, design, drafting and revision, approval of final version, supervision.

**Disclosures**

Competing interests: None.
Sponsorships: None.
Funding source: None.

**References**


