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EFFECTIVENESS OF - CAWTHRONE-COOKSEY, EPLEYS MANEUVER AND BRANDT DAROFF EXERCISES IN BPPV: A SYSTEMATIC REVIEW

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ABSTRACT

Peripheral vestibular disorders cover various inner ear conditions leading to symptoms like vertigo and imbalance. These include chronic and acute failures, along with recurrent disturbances like BPPV, Meniere's disease, and vestibular paroxysmia. A systematic review is essential to evaluate the effectiveness of Cawthorne-Cooksey, Epley maneuver, and Brandt-Daroff exercises in treating BPPV. Findings from this study can guide evidence-based clinical practices, enhancing patient outcomes in BPPV management. This systematic review was performed in PubMed, google scholar and PEDro and the studies on diagnostic accuracy of physical examination test used for identifying BPPV. Methodological quality of the studies meeting to inclusion criteria was assessed using score of PEDro scale. We have taken proper reference from 12 different articles and studied them thoroughly and concluded the study. From electronic searches, 127 articles were initially identified. After removing duplicates and screening against inclusion/exclusion criteria, 81 were excluded based on title and abstract. Subsequently, 46 full-text articles were reviewed, with 11 further exclusions due to low PEDro scale scores or study type. Ultimately, 12 articles meeting inclusion criteria were selected, all randomized-controlled trials (RCTs). The most effective exercise for BPPV treatment requires careful consideration of patient-specific factors, including the type and severity of BPPV, and individual responses to treatment. Epley's Maneuver is highly effective, particularly for posterior canal BPPV, while Cawthorne-Cooksey Exercises focus on enhancing vestibular function and reducing symptoms. Brandt-Daroff Exercises are suitable for milder forms of BPPV or individuals unable to tolerate other treatments. Each approach has distinct strengths and may be more suitable for certain patients or types of BPPV.

Keywords: BPPV, Vestibular, Epley's, Brandt- Daroff, Cawthorne-Cooksey, Maneuver

1. INTRODUCTION

Peripheral vestibular disorders encompass various conditions, including chronic bilateral vestibular failure marked by postural imbalance (known as bilateral vestibulopathy), acute unilateral vestibular failure presenting with sudden rotatory vertigo (e.g., vestibular neuritis), and recurrent disturbances in the peripheral vestibular system resulting in repeated vertigo episodes (e.g., benign paroxysmal positional vertigo, Meniere's disease, vestibular paroxysmia, or superior canal dehiscence syndrome). These distinctions are made based on factors such as anatomy, physiology, pathophysiology, and observable signs and symptoms, as outlined by Strupp and Brandt in 2013. Among these disorders, benign paroxysmal positional vertigo (BPPV) stands out as the most prevalent cause of peripheral vestibular-related vertigo **[1]**.

Benign paroxysmal positional vertigo (BPPV) is a condition affecting the inner ear, marked by recurrent instances of positional vertigo. The term positional vertigo refers to the dizziness experienced when the head assumes a specific position, causing a spinning sensation due to changes in head position relative to gravity. Benign paroxysmal positional vertigo (BPPV) stands as the most prevalent disorder affecting the peripheral vestibular system, with an incidence of 0.6% per year and varying prevalence. BPPV can affect any semicircular canal, but the involvement of the posterior canal is most frequent, attributed to its connection with the otoliths when an individual is in reclined position **[2]**.

The pathophysiology of BPPV has been a subject of debate. In 1969, Schuknecht introduced the concept of cupulolithiasis, suggesting that canal debris attaches to the cupula, rendering it overly responsive to gravity. A decade later, Hall et al. proposed an alternative explanation, asserting that in canalithiasis, degenerative debris doesn't adhere to the cupula but instead floats freely in the endolymph of the canal's long arm. According to Hall et al., vertigo and nystagmus result from ampullary stimulation caused by these unattached particles when the head moves in the same plane as the posterior semicircular canal **[3]**.

To understand the etiology of benign paroxysmal positional vertigo (BPPV), it's crucial to grasp the normal anatomy and physiology of the semicircular canals (SCCs) within the inner ear **[4]**.

Each inner ear contains three SCCs positioned in three perpendicular planes. Each canal consists of a tubular arm (crura) emanating from a larger barrel-like compartment. At the end of each arm, there

is a dilated (ampullary) portion situated closer to the top or front. Here, the crista ampullaris houses nerve receptors **[4]**.

To detect fluid flow in the SCCs, each crista ampullaris contains a sail-like tower called the cupula. When there is a sudden movement in a particular direction, the fluid in the corresponding horizontal canal lags behind, causing the cupula to deflect in the opposite direction (ampullopetal flow). This deflection generates a nerve signal, confirming the rotation of the head in that direction. Thus, the cupula acts as part of a three-way system that accurately informs the body of a sensation of motion. The neutral position presents no motion signal **[4]**.

In cases of vertigo, particles in the canal can slow down or even reverse the motion of the cupula, creating signals that are inconsistent with the actual head movement. This discrepancy in sensory information leads to the sensation of vertigo **[4]**.

With BPPV, otoconia (also known as "otoliths" or "canaliths") become dislodged and settle within the endolymph of the semicircular canals. When the head is static, there is no stimulus. However, with motion, the displaced otoconia shift within the fluid, causing an unbalanced stimulus compared to the opposite ear. This imbalance in stimuli inappropriately triggers symptoms such as dizziness, spinning, and/or swaying. As a result, BPPV symptoms are most pronounced with movement **[4]**.

The clinical management of benign paroxysmal positional vertigo (BPPV) is crucial in preventing adverse outcomes for patients. Clinical practice guidelines recommend routine physical maneuvers, such as the Dix-Hallpike test (DHT) and canalith repositioning techniques (CRT), to assess and treat BPPV. Failure to accurately diagnose and treat BPPV can lead to inappropriate medication use, increased risk of falls, disruption of daily activities, and decreased quality of life **[5]**.

Specialized vestibular physiotherapy (SVP) has shown effectiveness in diagnosing and treating BPPV, with symptom resolution in a significant percentage of cases compared to spontaneous resolution. Recent studies have demonstrated that patients receiving SVP within emergency and acute care settings experienced reduced dizziness and vertigo, as well as improved mobility. Additionally, a validated vestibular screening tool has been developed for physiotherapists working in these contexts, enhancing diagnostic accuracy **[5]**.

Despite the availability of training and expertise in managing peripheral vestibular dysfunction, SVP is not routinely implemented in the emergency department (ED) setting. Limited research has evaluated the implementation process of SVP in the

ED or its long-term sustainability. However, evidence suggests that ED physiotherapists could effectively provide evidence-based BPPV management, although this area requires further investigation **[5]**.

To address this gap, this study aimed to conduct a mixed-methods formative process evaluation to assess the feasibility of implementing SVP in an ED from the clinician's perspective. Understanding the implementation processes and strategies required for adopting SVP in the ED is essential for its effective and efficient dissemination. This research seeks to provide insights into the feasibility and potential barriers to implementing SVP in the ED setting, ultimately aiming to improve the management of BPPV and enhance patient outcomes **[5]**.

Building on the canalithiasis theory, Epley developed the canalith repositioning procedure, later known as the Epley maneuver. This maneuver aims to relocate free canaliths by gravitational forces from the posterior semicircular canal to the utricle, eliminating interference with the semicircular canals' dynamics. While some evidence supports the safety and efficacy of the Epley maneuver for BPPV, there is limited evidence regarding its ability to provide a long-term resolution of symptoms **[4]**.

The Modified Canalith Repositioning Procedure, also known as Epley's maneuver, has an alternative called the Particle Repositioning Maneuver (PRM), a three-step procedure. The individual is first seated on a couch and instructed to rotate their head towards the affected side while extending it to 30˚ **[6]**.

Subsequently, the individual lies down on their side with the affected ear facing the ground. The head is then rotated 180˚ to the opposite side, with the neck maintained in 30˚ extension. Rolling onto the unaffected side shoulder, the individual is gradually brought back to a sitting position, keeping the head rotated to the opposite side. A soft collar is then applied to prevent vertical movements that could potentially dislodge the otoconia **[6]**.

Each position is held for 1-2 minutes or until vertigo and nystagmus cease. To confirm the repositioning of the otoconia, the individual is instructed to maintain an upright position for 1-2 nights (preferably sleeping in a recliner chair) and to avoid sleeping on the affected side for an additional 5 nights. Horizontal movements are encouraged to prevent neck stiffness between each step **[6]**.

The Brandt-Daroff maneuver, or Brandt-Daroff exercise, was conducted three times daily over a span of two weeks. While seated upright, the participant was directed to transition into a side-lying position,

tilting the head upward by approximately half. This side-lying posture was maintained for 30 seconds or until the dizziness diminished, after which the patient returned to a sitting position. Remaining in the seated position for an additional 30 seconds, the subject then repeated the same sequence on the opposite side. These exercises were to be performed at home in three sets (morning, afternoon, and evening), with each session consisting of three repetitions **[6]**.

The most frequently employed protocol for vestibular rehabilitation programs is the CCE (Cawthrone-Cooksey Exercise) method. This approach encompasses activities targeting various balance centers, including visual, proprioceptive, and vestibular components. Additionally, CCE is effective in promoting the generation of new sensory information from the environment and possesses the capacity to enhance balance responses, thereby reducing the risk of falls **[7]**.

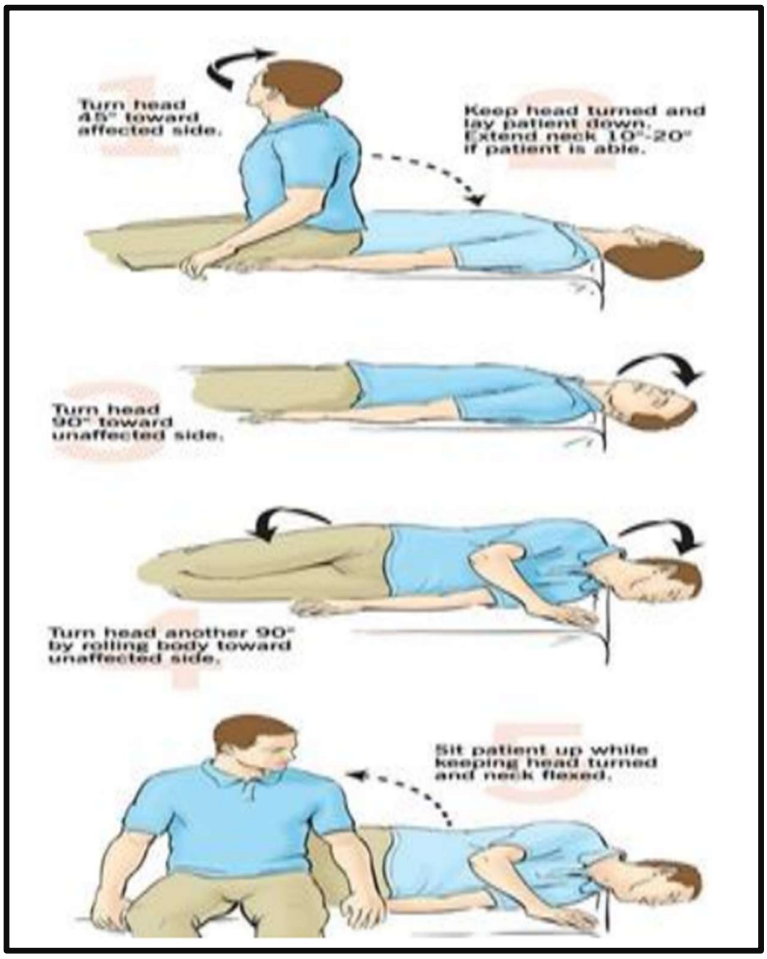

Figure 1: Epley's Maneuver [8]

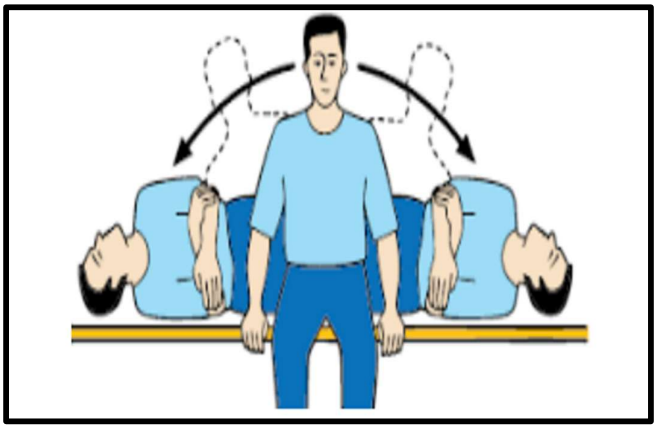

Figure 2: Brandt- Daroff Exercise [8]

2. MATERIALS & METHODS

Search strategy for the identification of studies:-

This study is a literature review, comprising articles published from 2014 to 2023 and indexed at the following databases. Medline, Google Scholar, and PubMed, with the following keywords in English, respectively: "vertigo", "balance", "vestibular neuritis", or "physical therapy", "rehabilitation." The selected articles were analysed according to the title and abstract. Forty- five articles were found. Any additional study that seemed eligible was retrieved and assessed according to title, abstract, and keywords. When the title or abstract did not clearly indicate whether an article should be included, the full text article was retrieved and reviewed. The full texts of identified studies were subsequently obtained and further assessed with the application of the following inclusion criteria.

Criteria for considering studies for this review

Inclusion criteria for the review included the following:-

- Population: The articles considered included patients of any age with a clinical diagnosis of BPPV, in acute or chronic stages.
- Intervention: Only physical therapy interventions were considered for the study.
- Problem: Patients with a clinical picture of a dizziness. Either in standing or while changing positions or during head movement exists.
- Characteristics of the selected studies: Randomized controlled clinical trials and experimental studies were included in this study all physical therapy that may be used by physiotherapists during rehabilitation without restriction to

only PTs that have a stated objective of promoting recovery of balance.

- PEDro score >5
- Studies that have been taken place between 2014 to 2023.

Exclusion criteria:

• Studies were excluded where clinical tests were positive in the neuropathic conditions.

Research tools:

The physiotherapy evidence database (PEDro) scale was used as critical appraisal instrument in the study. It has 11 elements and each element required a yes/no response. Each yes was given 1 point and no got 0 point. PEDro score has a total score of 10.

Interpretation of PEDro score:

- 9- 10 points – excellent
- 6-8 points – good
- 4-5 points – fair
- Less than 4 points- poor

Data extraction:-

Data extraction was a precised process and it was done in terms of inclusion and exclusion criteria, intervention, study design, sample size, result and conclusion. Also, the nature of intervention, outcome measures, and period of publication was taken into consideration for accurate data extraction.

Methodological quality assessment of the studies

Trials included in this review were rated using a checklist called the Pedro scale **(Table 1)**. The Pedro scale is based on the Delphi list, a validated quality assessment tool **[9]**.

This scale considers the following aspects of trial quality:

a. the internal validity of the trial; and
b. whether or not the trial contains sufficient statistical information to be interpretable.

Table 1: PEDro scale

Sr. No.	All criteria		
1	Eligibility criteria were specified	Yes	No
2	Subjects were randomly allocated to groups	Yes	No
3	Allocation was concealed	Yes	No
4	The groups were similar at baseline regarding the most important prognostic indicators	Yes	No
5	There was blinding of all subjects	Yes	No
6	there was blinding of all therapists who administered the therapy	Yes	No
7	There was blinding of all assessors who measured at least one key outcome	Yes	No
8	Measures at least one key outcome were obtained from more than 85% of the subjects initially allocated to groups	Yes	No
9	All the subjects for whom outcome measures were available received the treatment or control condition as allocated or, where this was not the case, data for at least one key outcome was analysed by “intention to treat”	Yes	No
10	The results of between-group statistical comparisons are reported for at least one key outcome	Yes	No
11	The study provides both point measures and measures of variability for at least one key outcome	Yes	No

Legend: No indicates 0 points, yes, I point for the numbers 2-11

In order to enhance an evidence-based approach to the teaching and practice of physiotherapy. the Physiotherapy Evidence Database (pedro) was introduced in October 1999. In total, the Pedro scale contains 11 items, of which 10 assess internal validity. We omitted criterion one (eligibility criteria) when judging the studies because it refers to the generalisation of the results. For each study, the maximum score on the Pedro scale was calculated as a total score ranging from 0 to 10 by adding the dichotomized scores of 2-11 on the Pedro scale. While the authors state that overall pedro scores of 0-3 is considered "poor." 4-5 are considered "fair." 6-8 is considered "good," and 9-10 is considered "excellent,"

ASSESSMENT, INTERPRETATION, AND COLLECTION

To gather proof, all of the databases' full-text articles that were available were downloaded. They were evaluated critically and given a PEDro score.

3. RESULT

The electronic searches yielded a total of 127 articles and following the removal of duplicates and screening against the inclusion and exclusion criteria, 81 were excluded at the title and abstract stage. 46 full-text articles were obtained and screened, studies. Furthermore, 11 articles were excluded because of a low score on the PEDro scale and some of them were systemic review or case study so, 12 articles finally meet the inclusion criteria and are therefore included in this literature. In which all participants were adults with ischemic and haemorrhagic stroke in all stages (acute, sub-acute, and chronic). All articles included in the study were randomized-controlled trials (RCTs), an experimental study where patients are randomly divided into 2 or more groups. All of these were RCTs that investigated the effectiveness of different physical approaches.

For this study we have reviewed 12 articles and concluded that upon thorough examination of numerous studies investigating the efficacy of maneuvers and exercises for treating benign paroxysmal positional vertigo (BPPV), several key findings underscore the comparative effectiveness of these interventions. Springer's randomized controlled trial comparing Brandt-Daroff, Semont, and Epley maneuvers consistently demonstrated the superior performance of the Epley maneuver in resolving nystagmus and enhancing Dizziness Handicap Inventory (DHI) scores across multiple assessments. This superiority was further corroborated by Abdou Abd El-M El-Monem's quasi-experimental study, which highlighted substantial reductions in BPPV symptom severity and recurrence with both Epley's Maneuver and Brandt-Daroff Exercises.

Additionally, studies by H. Serap İnal and Sunil K. S. Bhadouriya explored combinations of maneuvers and exercises, indicating that while the Epley maneuver alone suffices for posterior semicircular canal BPPV, both Cawthorne-Cooksey exercises and Brandt Daroff exercises effectively manage residual symptoms post-Epley maneuver. Kiruthika Selvakumar's comparison of Modified Epley's Maneuver with Cawthorne–Cooksey exercises showed superior outcomes in balance confidence and DHI scores with combined therapy, suggesting tailored approaches to symptom management. Yasir Said Cetin's findings further supported the efficacy of Brandt-Daroff Exercises and Modified Epley maneuvers as viable treatment options. Overall, the Epley maneuver consistently emerged as a highly effective treatment for BPPV, particularly in cases involving the posterior canal, due to its capability to resolve nystagmus and improve patient-reported outcomes. Nevertheless, the selection of the most suitable maneuver or exercise regimen should consider individual patient factors and specific characteristics of BPPV.

Table 2: PEDro scores

Sr. No.	AUTHOR	PEDRO SCALE											SUM
		1	2	3	4	5	6	7	8	9	10	11	
1	Homero O. Mayoral-Flores, Luis A. Torrontegui-Zazueta, and Cindy A. Medina-Cabrera. [10]	NO	1	0	0	1	0	0	1	1	1	1	6
2	Hoda A, El-Monem El-Deeb. [11]	NO	1	0	1	0	0	0	1	1	1	1	6
3	Ekin Taçalan, Serap İnal, Nafiz Şentürk, and Erdem Mengi.[12]	YES	1	0	1	0	0	0	1	1	1	1	6
4	Sunil K. S. Bhadouriya, Shaili Priyamvada, and Hukam Singh.[13]	YES	1	0	1	0	0	0	1	1	1	1	6
5	S. Divya, R. Arunachalam, A. Kumaresan, and S. Kiruthika. [14]	YES	1	1	1	0	0	0	1	1	1	1	7
6	Yaser Said Cetin, Omer Afsin Ozmen, and Uygar Levent Demir. [15]	YES	1	0	1	0	0	0	1	1	1	1	6
7	Andika Herlina, Ibrahim, Vino Nofia. [16]	YES	1	1	0	1	1	1	1	1	0	1	8
8	Jose Luis Ballve Moreno, Ricard Carrillo Muñoz, and Yolanda Matos Rando. [17]	YES	1	0	1	1	1	1	1	1	0	1	8
9	Ricard Carrillo Muñoz, Iván Villar Balboa, Yolanda Rando Matos, and Olga Lucia Arias Agudelo. [18]	NO	1	1	1	1	1	1	1	1	0	1	9
10	Anan Kulthaveesup , Kanokrat Bunnag. [19]	YES	1	1	1	0	0	0	1	1	1	1	7
11	Tj. D. Bruintjes, J. Companjen, H.J. van der Zaag-Loonen,P.P.G. van Benthem. [20]	YES	1	1	1	1	1	1	1	1	0	1	9
12	Erika Maria Celis-Aguilar, Cindy Anahí Medina-Cabrera, and Luis Alejandro. [21]	YES	0	1	0	0	0	1	1	1	1	1	6

Table 3: Study Design

ARTICLE No.	STUDY DESIGN	PEDro Score	QUALITY
1	Comparative study	6	Good
2	Observational study	6	Good
3	Comparative study	6	Good
4	Comparative study	6	Good
5	Experimental study	7	Good
6	Comparative study	6	Good
7	Experimental Study	8	Good
8	Experimental study	8	Good
9	Experimental Study	9	Good
10	Comparative study	7	Good
11	Experimental study	9	Good
12	Observational study	6	Good

4. DISCUSSION

Benign Paroxysmal Positional Vertigo (BPPV) is a common and usually benign vestibular disorder that causes brief episodes of intense dizziness (vertigo) triggered by specific head movements. The condition is characterized by the displacement of small calcium crystals, known as otoliths or canaliths, within the inner ear, particularly in the semicircular canals. The main aim of this systematic review was to evaluate the effectiveness of the given maneuvers for treating BPPV **[2]**. From the literature search we found 35 different studies out of these 12 studies were selected and evaluated that aimed to find out diagnostic accuracy of different exercises maneuvers used in the treatment of BPPV.

The effectiveness of the Epley maneuver in treating benign paroxysmal positional vertigo (BPPV) has been extensively studied and widely acknowledged in clinical practice. The Epley maneuver, also known as canalith repositioning maneuver, is a simple, non-invasive procedure designed to reposition displaced otoliths (calcium carbonate crystals) within the semicircular canals of the inner ear, particularly targeting the posterior canal, which is the most common site of BPPV **[6]**.

Numerous clinical trials and observational studies have consistently demonstrated the efficacy of the Epley maneuver in providing rapid and sustained relief of symptoms associated with BPPV. The maneuver has been shown to effectively alleviate vertigo, dizziness, and associated symptoms, leading to improved patient outcomes and quality of life **[22]**.

For example, a randomized controlled trial by Tj D Bruintjes found that the Epley maneuver resulted in long-term resolution of symptoms in patients with posterior canal BPPV. Similarly, a study published in the British Journal of General Practice showed that a single Epley maneuver performed in primary care settings effectively reversed a positive Dix-Hallpike test and reduced

vertigo severity in patients with baseline nystagmus **[20]**.

Moreover, the Epley maneuver has been compared with alternative interventions, such as self-administered maneuvers or vestibular rehabilitation exercises, in various studies. While some studies have suggested comparable effectiveness between the Epley maneuver and alternative interventions, others have consistently demonstrated the superiority of the Epley maneuver in achieving symptom resolution and improving patient outcomes **[22]**.

Despite its effectiveness, the Epley maneuver may have limitations, such as the need for trained healthcare providers to perform the maneuver correctly and the possibility of transient exacerbation of symptoms during or immediately after the maneuver. Additionally, some patients may require multiple maneuvers or further diagnostic evaluation to achieve complete resolution of symptoms.

Overall, the evidence strongly supports the effectiveness of the Epley maneuver as a safe, well-tolerated, and highly successful treatment option for BPPV. However, individualized treatment plans, patient education, and follow-up may be necessary to optimize outcomes and ensure long-term symptom relief.

The Brandt-Daroff exercises are a series of positional maneuvers aimed at alleviating benign paroxysmal positional vertigo (BPPV). Although the precise pathophysiological mechanisms underlying their efficacy remain incompletely understood, they are believed to operate on principles of vestibular habituation and adaptation.

The goal of Brandt-Daroff exercises is to foster adaptation and habituation of the vestibular system to these abnormal stimuli. These exercises involve a series of specific head and body movements designed to provoke vertigo symptoms, followed by a period of rest. The repetition of these movements is thought to desensitize the vestibular system over time, thereby reducing the intensity and frequency of vertigo episodes associated with BPPV **[23]**. Although the precise mechanisms driving the effectiveness of Brandt-Daroff exercises remain unclear, clinical studies have demonstrated their ability to improve symptoms in some patients with BPPV. However, the efficacy of these exercises may vary depending on factors such as the specific type and location of BPPV, as well as individual patient characteristics **[23]**.

In summary, while the exact pathophysiological mechanisms underlying the effectiveness of Brandt-Daroff exercises in BPPV are not fully elucidated, they are believed to operate through promoting adaptation and habituation of the vestibular

system to abnormal stimuli. As with any BPPV treatment, it is essential for patients to seek guidance from a healthcare professional to determine the most appropriate management strategy tailored to their specific needs and circumstances.

The Cawthorne-Cooksey maneuver, also known as vestibular rehabilitation exercises, is a set of exercises aimed at improving balance and reducing symptoms associated with benign paroxysmal positional vertigo (BPPV). While the exact pathophysiology underlying its effectiveness is not fully understood, it is believed to operate through mechanisms of vestibular adaptation and compensation **[24]**.

The Cawthorne-Cooksey maneuver aims to promote adaptation and compensation of the vestibular system to these abnormal stimuli. It involves a series of exercises and movements that challenge the vestibular system, encouraging it to recalibrate and adjust to the altered sensory input. These exercises may include activities such as eye movements, head movements, and changes in body position, performed gradually and in a controlled manner **[24]**.

Although the precise mechanisms by which the Cawthorne-Cooksey maneuver improves BPPV symptoms are not fully understood, clinical studies have demonstrated its efficacy in reducing vertigo and enhancing balance in some patients. It is believed that these exercises assist the brain in integrating conflicting sensory information from the inner ear, eyes, and proprioceptive receptors, leading to improved vestibular function and symptom relief **[24]**.

In conclusion, while the exact pathophysiological basis of the effectiveness of the Cawthorne-Cooksey maneuver in BPPV remains unclear, it is thought to involve mechanisms of vestibular adaptation and compensation. As with any BPPV treatment, it is crucial for patients to seek guidance from a healthcare professional to determine the most appropriate management strategy tailored to their specific needs and circumstances.

The effectiveness of treatment for benign paroxysmal positional vertigo (BPPV), including the Epley maneuver, Cawthorne-Cooksey exercises, and Brandt-Daroff exercises, can vary depending on factors such as the type and location of BPPV, individual patient characteristics, and preferences. Epley's is the first line of treatment for BPPV as the studies suggest but a combination of these treatment approaches may be beneficial, particularly for individuals with persistent or recurrent BPPV symptoms.

The order in which these treatments are administered may vary depending on the specific needs and preferences of the

patient, as well as the recommendation of their healthcare provider. For example:

1. The Epley maneuver may be performed initially to address the acute vertigo episode associated with posterior canal BPPV.
2. Vestibular rehabilitation exercises (Cawthorne-Cooksey maneuver) may be initiated following the resolution of acute symptoms to promote long-term vestibular adaptation and improve balance.
3. Brandt-Daroff exercises may be prescribed as a self-administered home treatment option or as an adjunct to other maneuvers to further reduce the intensity and frequency of vertigo episodes.

Ultimately, the choice of treatment for BPPV depends on various factors, including the type and location of BPPV, the patient's preferences and individual characteristics, and the recommendation of their healthcare provider. In many cases, a healthcare provider may tailor the treatment approach based on the specific needs and circumstances of the patient.

5. CONCLUSION

Determining the most effective exercise for BPPV among Epley's maneuver, Cawthorne-Cooksey exercises, and Brandt-Daroff exercises requires careful consideration of various factors, including the specific characteristics of the patient, the underlying cause and severity of BPPV, and individual response to treatment. Each exercise has its own strengths and may be more suitable for certain individuals or types of BPPV.

1. Epley's Maneuver (Canalith Repositioning Procedure): This maneuver is highly effective for treating certain types of BPPV, particularly posterior canal BPPV, by repositioning displaced otoconia within the semicircular canal. It is a well-established and widely used technique, often recommended as the first-line treatment for posterior canal BPPV due to its high success rate in resolving symptoms.
2. Cawthorne-Cooksey Exercises: These exercises focus on habituation, balance, and gaze stabilization exercises, aiming to improve vestibular function and reduce symptoms of vertigo and dizziness. While they may not directly address the specific mechanical issue causing BPPV, they can help improve overall vestibular function and reduce symptoms over time, particularly in cases where BPPV coexists with other vestibular disorders or balance impairments.
3. Brandt-Daroff Exercises: These exercises involve a series of repeated movements to habituate the vestibular

system to positional changes and reduce symptoms of vertigo associated with BPPV. They are typically recommended for individuals with milder or less specific forms of BPPV, such as those with recurrent or residual symptoms after undergoing Epley's maneuver or for individuals unable to tolerate other treatments.

4. Future experimental studies need to be conducted for these methods to know which is more effective clinically and to know how can we plan the future treatment depending on the patient symptoms.

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