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Benign Paroxysmal Positional Vertigo (BPPV): A Case Report

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BENIGN PAROXYSMAL POSITIONAL VERTIGO (BPPV): A CASE REPORT

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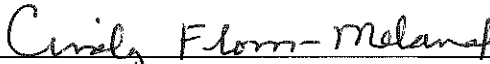
A scholarly Project Submitted to the Graduate Faculty of the

Department of Physical Therapy
School of Medicine and Health Sciences
University of North Dakota

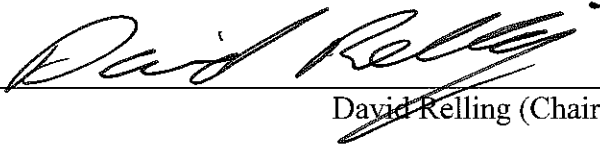
In partial fulfillment of the requirements for the degree of
Doctor of Physical Therapy

Grand Forks, North Dakota
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This Scholarly Project, submitted by Kylie J. Palmiseno in partial fulfillment of the requirements for the Degree of Doctor of Physical Therapy from the University of North Dakota, has been read by the Advisor and Chairperson of Physical Therapy under who the work has been done and is hereby approved.



Cindy Flom-Meland (Graduate School Advisor)



David Relling (Chairperson)

PERMISSION

Title Benign Paroxysmal Positional Vertigo (BPPV): A Case Report

Department Physical Therapy

Degree Doctor of Physical Therapy

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Date

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TABLE OF CONTENTS

LIST OF FIGURES	v
LIST OF TABLES	vi
ABSTRACT	vii
CHAPTER	
I. BACKGROUND AND PURPOSE	1
II. CASE DESCRIPTION	6
a. Examination, Evaluation and Diagnosis	7
b. Prognosis and Plan of Care	8
c. Intervention	9
d. Outcomes	11
III. DISCUSSION	13
a. Reflective Practice	14
APPENDIX	16
REFERENCES	19

LIST OF FIGURES

Figure 1. Anatomy of the inner ear	2
Figure 2. Planes of the semicircular canals.....	3
Figure 3. Prevalence of semicircular canal involvement.....	3
Figure 4. The Epley maneuver with inner ear depiction.....	10
Figure 5. Brandt-Daroff exercises for self-treatment.....	11

LIST OF TABLES

Table 1. Diagnosis based on Type of Nystagmus Present4
Table 2. Treatment Sessions Necessary with and without Postural Restrictions14

ABSTRACT

BACKGROUND AND PURPOSE: Benign paroxysmal positional vertigo (BPPV) is the most common vestibular disorder. Of the vestibular disorders diagnosed in the general population, BPPV accounts for one third and may be successfully diagnosed and treated by a physical therapist in as little as one visit.

METHODS/CASE DESCRIPTION: This is a single case report of a 36-year-old female who was 5 months pregnant and diagnosed by her physician with vertigo. She was referred to physical therapy for further evaluation and treatment.

FINDINGS/INTERVENTION: With use of the Dix-Hallpike Maneuver the patient's diagnosis was confirmed and specified to be BPPV of the right posterior canal. She then underwent two rounds of treatment utilizing the Epley maneuver.

CLINICAL RELEVANCE/OUTCOMES: It was noted that the nystagmus that was present on the first round of Epley maneuver was absent on the second round. The patient reported significant decrease in symptoms post treatments. She was instructed on a home exercise program of Brant-Daroff exercises for future episodes.

DISCUSSION/CONCLUSION: This case report describes proper diagnosis and treatment of BPPV by a physical therapist in just one visit with proper instruction on home exercise program of Brandt-Daroff exercises.

CHAPTER I

BACKGROUND AND PURPOSE

Benign paroxysmal positional vertigo (BPPV) is the most common vestibular condition diagnosed in the general population. This diagnosis accounts for one third of the vestibular disorders. It is peripheral vestibular disorder and is described as the presence of brief episodes of vertigo following quick head movement or position changes.^{1, 2, 3} In most cases, like the one discussed in this case study, the cause of this disorder is unknown or idiopathic. However, BPPV may also be caused by head trauma, vestibular neuritis, vertebrobasilar ischaemia, labyrinthitis, as a complication of middle ear surgery, and/or following periods of prolonged bed rest. Idiopathic BPPV is most common in patients 50-70 years of age and is more common in females than males.⁴

The episodes of vertigo experienced by patients with BPPV are caused by an imbalance in the inner ear.^{1, 2, 4, 5, 6} The human inner ear is part of the peripheral vestibular system. The primary functions of this system are: keeping the visual image stable during head movements to allow for clear vision, maintain postural stability during movement especially head movement, and it provides feedback allowing proper spatial orientation.⁵ The mechanism of the inner ear is called the vestibular labyrinth and is depicted in figure 1.² Within the utricle there are crystalline-structure materials called otoconia. It is thought that these crystals become free from the utricle and fall into the semicircular canals causing vertigo symptoms.^{4, 5, 6}

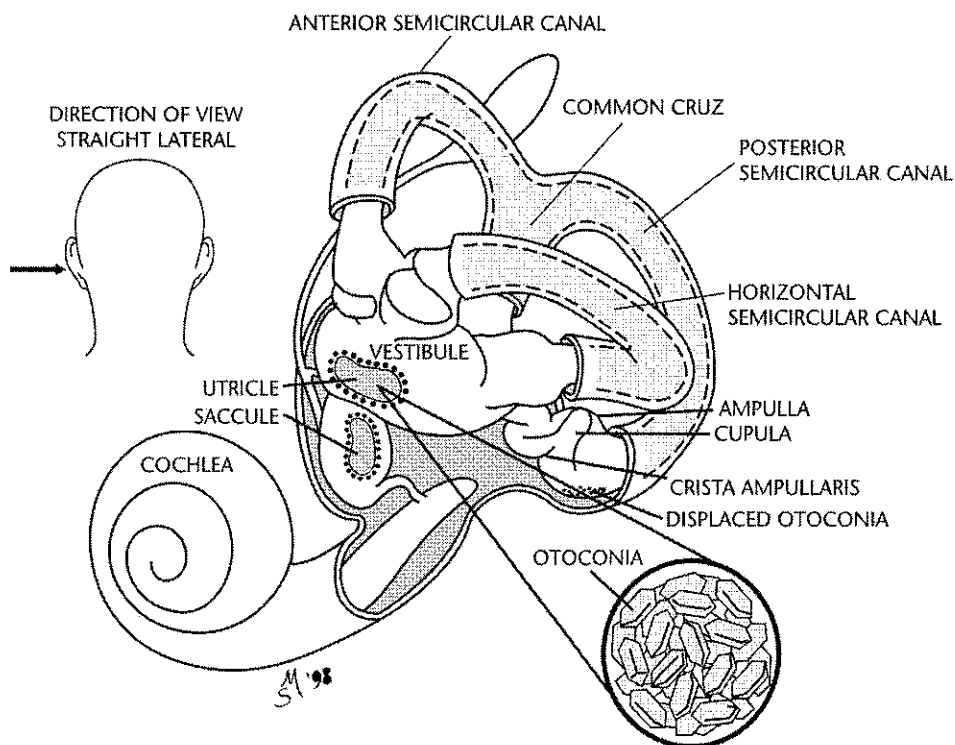


Figure 1. Anatomy of the inner ear²

There are three semicircular canals of the inner ear that may be affected by BPPV, the anterior canal, the horizontal canal, and the posterior canal. Each canal responds to angular acceleration within a plane that is 90° from one another allowing proper spatial orientation in all three planes.⁵ The planes that the semicircular canals lay are depicted in figure 2.⁷ Also figure 3⁸ is a pie graph of the prevalence of each canal involvement. The primary canal involvement seen is the posterior canal, which is most efficiently treated with canalith repositioning maneuver known as Epley's.^{1, 8}

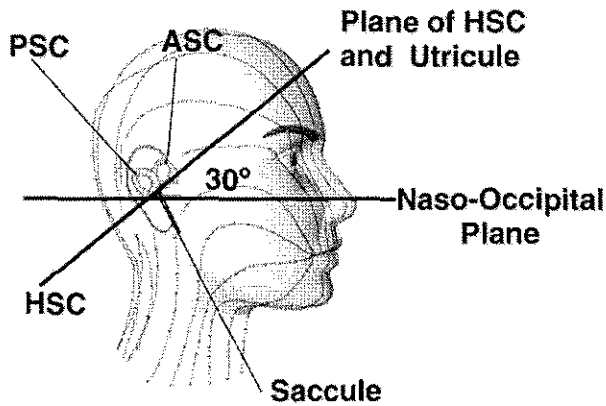


Figure 2. Planes of semicircular canals⁷

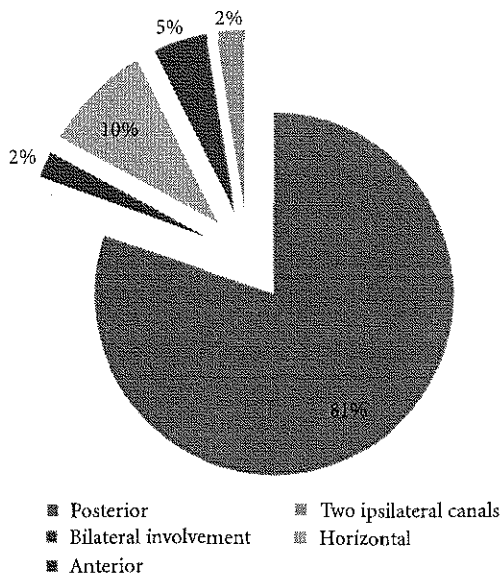


Figure 3. Prevalence of semicircular canal involvement⁸

Symptoms of BPPV include vertigo-like episodes lasting for up to one minute. These episodes may be accompanied with nausea and vomiting that lasts longer than the dizziness but this is not present in all cases. Patients may report these episodes occurring when lying down into bed, looking up putting their head/neck into extension, bending over, and sitting up from supine. The patient's balance will be affected during the episode but should remain

normal between vertigo periods. In addition, if the horizontal canal is involved the patient will also experience an episode with turning over from side to side in a supine position.^{4, 5, 6}

The diagnostic sign of BPPV, which is not always present but seen in most cases is nystagmus¹. This is a twitch like movement of the eye when the head changes positions quickly. The Dix-Hallpike maneuver is most commonly used to assess the nystagmus.³ Depending on the involved semicircular canal the nystagmus will move in specific directions with a certain head movement indicating which of the three is primarily involved. Table 1 describes that type of nystagmus present specific to each canal during testing. Then treatment may be directed towards precisely targeting that canal with the proper canalith repositioning technique.^{5, 9}

Table1. Diagnosis Based on Type of Nystagmus Present.⁹

SC Canal	Diagnostic Maneuver	Nystagmus
R Posterior	Dix-Hallpike R (+)	Upbeating Counterclockwise
	Dix-Hallpike L (-)	None
L Posterior	Dix-Hallpike R (-)	None
	Dix-Hallpike L (+)	Upbeating Clockwise
R Anterior	Dix-Hallpike R (+)	Downbeating Counterclockwise
	Dix-Hallpike L (+)	Downbeating Counterclockwise
L Anterior	Dix-Hallpike R (+)	Downbeating Clockwise
	Dix-Hallpike L (+)	Downbeating Clockwise

Treatment of BPPV is most commonly done with Epley’s canalith repositioning technique.^{1, 8, 10} A secondary option for treatment that is usually taught to patients as a home self-treatment technique is the Brandt-Daroff exercise. These should be done if symptoms persist after treatment but are not so severe that medical professional assistance is needed.^{4, 11}

The following is a single case study describing the diagnosis and treatment of Benign Paroxysmal Positional Vertigo (BPPV). The patient was female and diagnosed with right posterior canal BPPV by a physical therapist utilizing the Dix-Hallpike maneuver for

assessment. She was diagnosed and treated with Epley's canalith repositioning technique in a single visit. Treatment was concluded with patient education on self-treatment using Brandt-Daroff exercises as a home program.

CHAPTER II

CASE DESCRIPTIONS

The patient was a 36-year-old female who had been experiencing vertigo like symptoms for the past month. She was an elementary school teacher whom in her leisure time enjoys walking and running for exercise. She was married with a 4-year-old child and at the time of treatment 5 months pregnant with her second child. She had no prior history of vertigo and no history of trauma or incident that would indicate a cause to the disorder. She indicated a current family history of heart disease, high blood pressure, and arthritis. Prior to seeing her doctor she was not on any medications other than prenatal vitamins. Her symptoms had been continually increasing and worsen when she lies down to flat on her back. After the diagnosis from her doctor of vertigo she obtained a prescription for Meclizine. Meclizine is an anti-nausea medication that is often prescribed to patients struggling with dizziness and vertigo symptoms. As instructed by her physician, the patient took her first dose of meclizine prior to arriving at physical therapy. Her physician educated her on the therapy treatment for BPPV and that it would most likely exaggerate her symptoms so by taking her medication before arrival to physical therapy she could reduce the nausea and discomfort most likely expected with treatment. This patient had no recent history of head trauma or falls, no history of head or neck surgery or injury, and no other secondary diagnosis of concern. She had looked online for treatment options and had tried a few but feels that she was unable to do them correctly at home as they are not helping. She had been experiencing some nausea, but feels that was caused mostly from pregnancy, although the vertigo symptoms did make it worse at times.

Examination, Evaluation and Diagnosis

The patient completed the Dizziness Handicap Inventory (DHI).¹² A blank copy of this form can be found in the appendix. This is a questionnaire that is filled out by the patient to determine how the dizziness or unsteadiness that the patient is experiencing has been affecting her functional, physical and emotional ability to live everyday life. This patient scored 38 points, which put her in a category of moderate disability. Research shows that a DHI score of ≥ 50 , indicating high moderate to severe disability, has a statistically significant association with a diagnosis of BPPV.¹² Although this patient is below that mark we cannot rule out the probable diagnosis of BPPV and further examination will be obtained for proper diagnosis.

The Dix Hallpike maneuver was utilized to diagnosis the patient with BPPV in the posterior canal of her right inner ear. When performing this diagnostic tool it is best to use a plinth that is capable of 20° neck extension in supine. A table that met this qualification was available. The process begins with patient in the long sitting position, head rotated 45° towards indicated side, the right side in this case. She was then assisted to the laid back supine position with neck extended 20° maintaining the 45° rotation. At that time rapid nystagmus was observed and vertigo symptoms brought on indicating BPPV in the right posterior canal. These symptoms subsided with one minute of static positioning. Patient was returned to upright position to prepare for treatment. There is no current research available to test the reliability and validity of the Dix-Hallpike maneuver. However this is the assessment tool of choice for many research articles.¹⁻⁶

According to the Guide to Physical Therapy Practice,¹³ the diagnosis of Benign Paroxysmal Position Vertigo with right posterior canal involvement falls under the ICD-9

code of 386.11 BPPV. It is part of section 5A: Primary Prevention/Risk Reduction for Loss of Balance and Falling and expected number of visits range from 2-18. Treatment includes canalith-repositioning techniques.¹³

Prognosis and Plan of Care

The prognosis of this patient was very good. BPPV of the right posterior canal is treatable with the Epley Maneuver in as little as one visit. However, one occurrence of BPPV increases the risk of experiencing repeat episodes in the future requiring additional treatments. These repeat episodes may have a lessened treatment response. In the future this patient may need to have more treatment visits than what was necessary for the prior occurrence. The plan for this patient was to undergo the Epley Maneuver treatment today and allow her to return for addition treatments as needed until the symptoms have subsided. The patient would be educated and given a home exercise program with pictures and instructions on the Brant-Daroff exercises to continue at home to reduce any ongoing symptoms that may occur upon initial visit and treatment. Lastly, she will understand the necessary postural restrictions and precautions to take for the next few hours and days to ensure that the treatment be able to work to its full effect. She repeated them back to therapist as to insure her understanding. These include avoiding any inverted positions and quick movements.

The following were goals written by the physical therapist and student regarding the treatment of this patient's diagnosis of BPPV:

- Following PT intervention of Canalith Repositioning patient will have no nystagmus in 1-2 treatments to ensure the patient's safety and ability to safely care for her child

- Following education patient will be independent in HEP of Brandt-Daroff exercises in 1-3 sessions

No other goals were established at the time of initial examination.

Intervention

Due to the stage of the patient's pregnancy, the positions of canalith repositioning were discussed and patient gave consent and permission to continue therapy. The signs and symptoms of possible contraindications to the positions due to her pregnancy were covered and patient indicated knowledge of this and the ability to communicate to the therapist if any occurred during treatment.

Treatment of canalith repositioning technique of the Epley maneuver was administered to the patient due to its indication by the presence of nystagmus during the Dix-Hallpike assessment maneuver. The maneuver was done with focus to the right side as that was what had been previously diagnosed as the prominent involved side. The Epley Maneuver utilizes four positions. Each position must be accomplished quickly and held for 45 seconds. The first position is the same as the Dix Hallpike maneuver. The patient begins in long sitting with head rotated 45° towards indicated side, then is repositioned to supine with head extended 20° maintaining the 45° of rotation. The second position the patient maintains the supine position with 20° neck extension but head is rotated 90° to the opposite to accomplish 45° of rotation to that side. The third position is reached by moving the body 45° so patient is on their side while maintaining head position acquired in second position. The patient may independently roll into this position or may need assistance. The fourth and final position of the patient is seated with head in neutral but forward flex position. Physical therapist provides assistance in reaching this position. This maneuver has no research

evidence of reliability and validity. It is however the chosen treatment methods in research and shown to provide adequate outcomes for patients return to normal or prior functional status. This maneuver is depicted in figure 4.^{4, 6, 14}

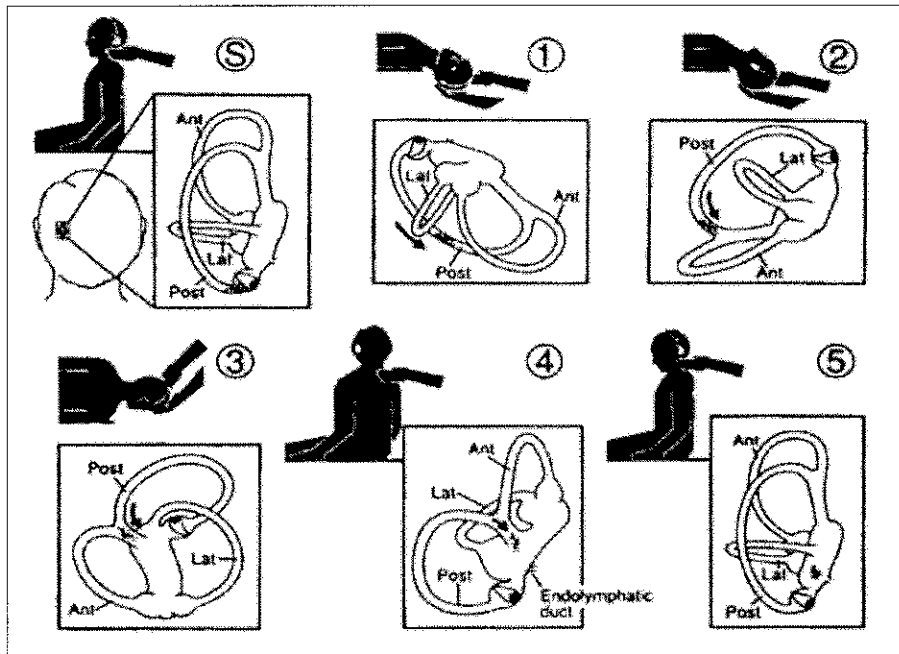


Figure 4. The Epley maneuver with inner ear depiction^{4,6,14}

This patient was treated with the Epley Maneuver as described on her right side. The entire treatment was done twice with the fourth and final position held for five minutes each time. During the second round of treatment it was noted that the nystagmus that had been seen and symptoms indicated by patient during the initial Dix Hallpike maneuver had subsided. This indicates that the treatment was successful, but does not mean that no further treatments are necessary. Further treatments were dependent on the patient's symptom presence and preference.

The patient was educated on Brant-Daroff exercise to self-treat at home if subtle symptoms were to persist. Instructions stated that the patient could complete exercises whenever symptoms became present. At least one full exercise should be done and no more

than three rounds of the exercises in a single day. If patient's symptoms cause the need for more than three rounds of Brant-Daroff exercise in one day, she was to return to physical therapy for further treatment. These exercises are depicted in figure 5.¹¹ Research shows that this maneuver is successful for home treatment but is not as effective as the administration of the Epley maneuver by a medical professional.^{5,11}

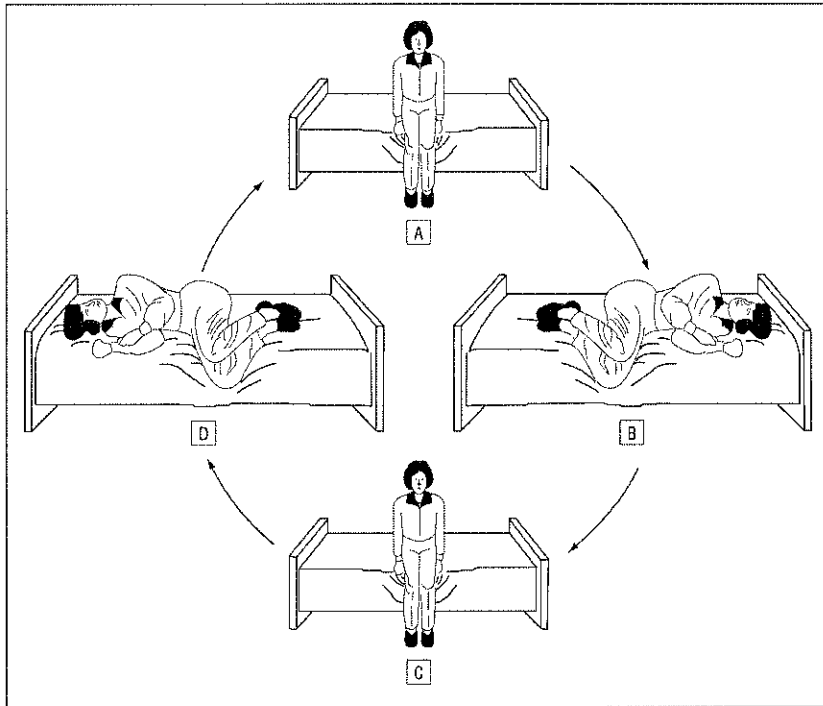


Figure 5. Brandt-Daroff exercises for self-treatment¹¹

Outcomes

The patient did not return for a follow-up appointment to re-evaluate the diagnosis. There was no contact with the patient in any way to obtain follow-up information. It was assumed that her symptoms subsided and she felt competent completing the home exercise program independently if further episodes should occur. Due to the lack of nystagmus upon the second round of treatment it may be concluded that the Epley maneuver was successful in the treatment of this diagnosis of BPPV in the posterior right canal. If the patient had

returned for follow up a DHI would have been filled out to compare to initial record and the Dix-Hallpike would have been re-administered with most likely an outcome of no presence of nystagmus and no other signs or symptoms of BPPV. Research shows that after treatment of the Epley maneuver patient DHI score show a positive statistically significantly impact on quality of life physically, emotionally, and functionally.^{2, 15}

CHAPTER III

DISCUSSION

This case study is an example of the physical therapy diagnosis and treatment of a patient with benign paroxysmal position vertigo of the right posterior canal. The patient was young and experienced no other comorbidities allowing for optimal results from the treatment of canalith reposition technique of the Epley maneuver. Due to no return for treatment it is assumed that the patient was successfully treated in one session of two bouts of treatment maneuvers. This is slightly faster than research shows, usually 2-3 treatment sessions minimum⁹ but this could be due to the need for reassessment to ensure successful treatment which was not available in this case study. Research also shows that treatment of posterior canal specifically can be completed in as little as one maneuver.¹⁶

The patient's diagnosis of BPPV was confirmed with noticeable nystagmus when the Dix-Hallpike maneuver was performed on the right side. Research shows that the specific direction of the nystagmus should be the definitive indicator of which canal is affected. The proper nystagmus that should be present when using the Dix-Hallpike maneuver on the right side is an up-beating motion in the clockwise direction.⁹ The specifics of the nystagmus present with this patient were not collected, it was only noted that the nystagmus was present in the appropriate position for indication to right sided posterior canal BPPV.

Postural restrictions were given to the patients to ensure complete effects of the treatment however research shows that these may not be necessary. The research results of the comparison of two groups of patients who were treated for BPPV, one group given postural restrictions after canalith reposition and the other just instructed to rest are shown in

table 2.⁸ This indicates no significant differences in the number of treatment sessions necessary for success or the incidence of reoccurrence compared to each group. Thus demonstrating that the postural restrictions given to the patient were unnecessary according to research.

Table 2. Treatment Sessions Necessary With and Without Postural Restrictions⁸

Treatments	With	Without
1	33 (80.5%)	31 (75.6%)
2-3	2 (4.9%)	3 (7.3%)
>3	6 (14.7%)	7 (17.1%)

With this report it is concluded that BBPV of the posterior canal can be diagnosed by a physical therapist with the Dix-Hallpike maneuver if nystagmus is present, specifically a clockwise up-beating. The patient may further be treated in 1-3 sessions of canalith repositioning technique, precisely the Epley maneuver specifically targeting the diagnosed side.^{9, 16} Following a review of research it is suggested that postural restriction following treatment are not necessary but education on patient implementation of Brandt-Daroff exercises for further self treatment, if necessary, is useful.^{9,11}

Reflective Practice

In the future, treatment of patients with BPPV will be done similarly to what has been recorded here. Based on the history the patients give and the motions they state promote the most intense symptoms it should be decided which side to test with the Dix-Hallpike maneuver for the determination of BPPV diagnosis. Once test is administered and the presence of nystagmus exists the side of involvement may be confirmed. The treatment will then focus on that indicated side. The Epley canalith repositioning maneuver should be used as treatment. It may cause increased symptoms during the positioning but should replace the

crystals within the inner ear to proper alignment within 1-3 treatment sessions, which will cause the symptoms to ultimately subside. The patient should be educated on Brandt-Daroff exercises as a home self-treatment option for continuing episodes. The postural restrictions given in this case report would be unnecessary for future patients, as research does not support the need for them.

Personally, I hope to continue educating myself in this area of physical therapy as it is a new area of research and is a diagnosis that is very prevalent in the elderly population. This being a population that I will most likely spend some time treating now that the “baby boomer” generation is reaching an older age and will most likely be a major patient source in my career. The experience describe here was my initial experience with treating a patient with BPPV, I hope in the future to be more comfortable in administration of canalith repositioning techniques as to help my patient be as comfortable as possible while their symptoms may be at their peak. I also hope to take time for do additional follow-up that was described in this case study. Ideally, I would like patients to return for a discharge appointment but that may be difficult in some situations. While that may not always be possible, I would contact patients via phone or other available course to ensure they are satisfied with their treatments and experience with me. Vestibular rehabilitation as a whole is very interesting to me and I plan to look into continuing education courses and possible certification in my future.

APPENDIX

The Dizziness Handicap Inventory (DHI)

P1. Does looking up increase your problem?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
E2. Because of your problem, do you feel frustrated?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
F3. Because of your problem, do you restrict your travel for business or recreation?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
P4. Does walking down the aisle of a supermarket increase your problems?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
F5. Because of your problem, do you have difficulty getting into or out of bed?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
F6. Does your problem significantly restrict your participation in social activities, such as going out to dinner, going to the movies, dancing, or going to parties?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
F7. Because of your problem, do you have difficulty reading?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
P8. Does performing more ambitious activities such as sports, dancing, household chores (sweeping or putting dishes away) increase your problems?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
E9. Because of your problem, are you afraid to leave your home without [REDACTED] having someone accompany you?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
E10. Because of your problem have you been embarrassed in front of others?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
P11. Do quick movements of your head increase your problem?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
F12. Because of your problem, do you avoid heights?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
P13. Does turning over in bed increase your problem?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
F14. Because of your problem, is it difficult for you to do strenuous homework or yard work?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
E15. Because of your problem, are you afraid people may think you are intoxicated?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
F16. Because of your problem, is it difficult for you to go for a walk by yourself?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
P17. Does walking down a sidewalk increase your problem?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
E18. Because of your problem, is it difficult for you to concentrate	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
F19. Because of your problem, is it difficult for you to walk around your house in the dark?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No

E20. Because of your problem, are you afraid to stay home alone?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
E21. Because of your problem, do you feel handicapped?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
E22. Has the problem placed stress on your relationships with members of your family or friends?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
E23. Because of your problem, are you depressed?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
F24. Does your problem interfere with your job or household responsibilities?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
P25. Does bending over increase your problem?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No

Used with permission from GP Jacobson.

Jacobson GP, Newman CW: The development of the Dizziness Handicap Inventory. *Arch Otolaryngol Head Neck Surg* 1990;116: 424-427

DHI Scoring Instructions

The patient is asked to answer each question as it pertains to dizziness or unsteadiness problems, specifically considering their condition during the last month. Questions are designed to incorporate functional (F), physical (P), and emotional (E) impacts on disability.

To each item, the following scores can be assigned:

No=0 Sometimes=2 Yes=4

Scores:

Scores greater than 10 points should be referred to balance specialists for further evaluation.

16-34 Points (mild handicap)

36-52 Points (moderate handicap)

54+ Points (severe handicap)

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