

COGNITIVE AND PHYSIO-THERAPIES FOR POSITIONAL VERTIGO DISORDERS

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ABSTRACT:

Vertigo is the most common cause of recurrent vertigo and affective 2.4% of the general population. Benign paroxysmal positional vertigo is caused when calcium carbonate material originating from the macula of the utricle falls into one of the semicircular canals. Due to their density relative to the endolymph, they move in response to gravity and trigger excitation of the ampullary nerve of the affected canal. This, in turn, produces a burst of vertigo associated with nystagmus unique to that canal. Recognition of this condition is important not only to avert expensive and often unnecessary testing, but also to easily, rapidly, and effectively treatment 90% of cases. Two well-established methods of treating BPPV form the basis for this project. By making people conscious of the phenomenon, helping them to cognitive choices, and bringing awareness in humans and finding the symptoms and proactive measures to mitigate the risk of positional vertigo. In forms of vertigo, where the inner ear has suffered damage and the function of that ear is fixed, not changing over time, physical therapy and behavioral therapy can be quite helpful. When the inner ear is damaged, people commonly experience severe spinning for several days. If after several weeks the person still has a loss of balance, then physical therapy can help restore this balance. The reason physical therapy and Behavioral therapy which is helpful to train the brain to compensate for the loss of function in the ear. Just as we can make a muscle stronger by exercising it, you can make the balance system in the brain work better by exercising it. The paper will give required knowledge and understanding of vertigo and its effective treatment techniques.

KEYWORDS: Vertigo, paroxysmal, , nystagmus, utricle, inner ear.

[I] INTRODUCTION

Vertigo may arise from a lesion or poor stimulation of peripheral or central vestibular structures encompassing brainstem, thalamus, or parieto insular vestibular cortex. The regular association of vertigo strike to the patients without aura complain of motion sickness like dizziness and nausea during the attack. Sudden transient attacks of incapacitating vertigo, postural imbalance and gait ataxia, associated with nystagmus, pallor, nausea, vomiting but no head ache or impairment of consciousness.

The semicircular canals, found within the vestibular apparatus, let us know when we are in a rotary (circular) motion. The semicircular canals are fluid-filled. Motion of the fluid tells us if we are moving. The vestibule is the region of the inner ear where the semicircular canals converge, close to the cochlea (the hearing organ). The vestibular system works with the visual system to keep objects in focus when the

head is moving. This is called the vestibulo-ocular reflex (VOR).[I]

Movement of fluid in the semicircular canals signals the brain about the direction and speed of rotation of the head - for example, whether we are nodding our head up and down or looking from right to left. Each semicircular canal has a bulged end, or enlarged portion, that contains hair cells. Rotation of the head causes a flow of fluid, which in turn causes displacement of the top portion of the hair cells that are embedded in the jelly-like cupula. Two other organs that are part of the vestibular system are the utricle and saccule. These are called the otolithic organs and are responsible for detecting linear acceleration, or movement in a straight line. The hair cells of the otolithic organs are blanketed with a jelly-like layer studded with tiny calcium stones called otoconia. When the head is tilted or the body

position is changed with respect to gravity, the displacement of the stones causes the hair cells to bend.[II]

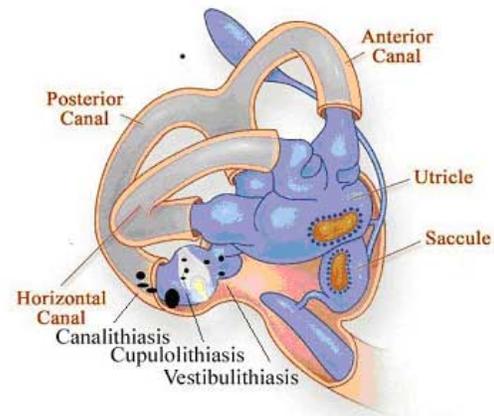
The balance system works with the visual and skeletal systems (the muscles and joints and their sensors) to maintain orientation or balance. For example, visual signals are sent to the brain about the body's position in relation to its surroundings. These signals are processed by the brain, and compared to information from the vestibular, visual and the skeletal systems. Based on this origin the proposed research measures to find the solutions for positional vertigo disorders.

[II] PROBLEM DEFINITION

Benign Paroxysmal Positional Vertigo (BPPV)

- The most common cause of vertigo. It is typically described as a brief, intense sensation of spinning that occurs when there are changes in the position of the head with respect to gravity. An individual may experience BPPV when rolling over to the left or right, upon getting out of bed in the morning, or when looking up for an object on a high shelf. The cause of BPPV is the presence of normal but misplaced calcium crystals called otoconia, which are normally found in [III] the utricle and saccule and are used to sense movement. If they fall from the utricle and become loose in the semicircular canals, they can distort the sense of movement and cause a mismatch between actual head movement and the information sent to the brain by the inner ear, causing a spinning sensation. Labyrinthitis - An inner ear infection or inflammation causing both dizziness (vertigo) and hearing loss. Vestibular neuronitis - an infection of the vestibular nerve, generally viral, causing vertigo

Benign means that it is due neither to a cancerous nor a serious cause. Paroxysmal means recurring sudden episodes of symptoms. Positional means that the symptoms are triggered by certain positions. In the case of BPPV, it is certain positions of the head that trigger symptoms.



Vertigo is dizziness with a spinning sensation. If you have vertigo you feel as if the world is spinning around you, and you feel very unsteady. Often you will also feel sick, and may vomit.

Inner ear balance organ: vestibule, semicircular canals, cochlea and audio-vestibular nerve

Vertigo can result from many causes, but is most often caused by damage to the balance organ of the inner ear. As well as the cochlea for hearing, the inner ear contains a very sensitive organ, the vestibular labyrinth, designed to help maintain balance.

The vestibular labyrinth is made up of three semicircular canals - lateral, posterior and superior. They join together at the vestibule.

The semicircular canals are arranged at right angles to one another. They can detect and measure movements and acceleration in all three planes of space.

The inner ear balance organ can also detect the direction of gravity.

Vertigo results when the brain believes the false signal and acts accordingly.

The commonest condition to affect the inner ear is labyrinthitis, which means inflammation of the labyrinth and causes severe rotatory vertigo. Labyrinthitis often causes permanent and irreversible damage to the inner ear. The recovery that follows is not because the inner ear gets better, but because the brain learns to ignore, adjust to or compensate for the false signal.

The brain learning to make allowances for the faulty information coming from the inner ear is known as central compensation.

[III] BRAIN PROCESS: Central processing of information in the brain is essential for balance.

It is obvious you need brain power to keep your balance. The two-legged human is not inherently stable. If your brain stops working, you will collapse into a heap on the ground. To be able to sit, stand, keep your balance, walk, run and jump, are learned skills.

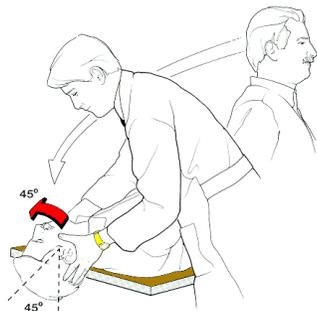
Even sitting up straight requires an immensely complex series of calculations, carried out microsecond by microsecond.

Instructions are sent from the brain down the nerve fibres to the muscles which control your head position, neck and spine, allowing you to stay stay upright.

The instructions are constantly updated by feedback from the joints and muscles themselves (proprioception) from the skin which feels the pressure of the seat, from the eyes which can see where you are, and from the inner ear which knows whether you are tilted backward, forward, sideways or moving.

EFFECTIVE PROCEDURES

Recent research finds A common cause of vertigo, benign positional paroxysmal vertigo (BPPV), its history, diagnosis and therapy is presented. BPPN is suggested by history, readily diagnosed by office examination, and cured by appropriate exercise therapy.



Since the condition is so common and often unrecognized. Some Research on Benign Paroxysmal Positional Vertigo. Suggested *The Epley maneuver by using Standard technique* Using movements of the head and body, which may be made gently, the affected posterior SCC is rotated with respect to gravity such that

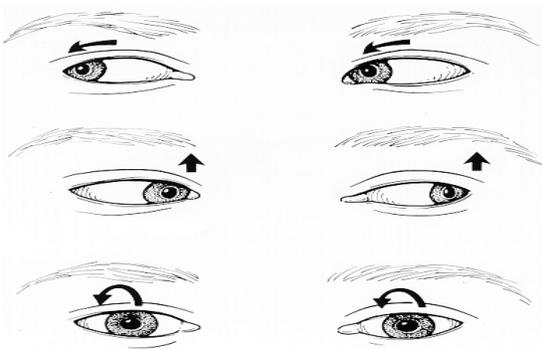
canaliths are moved out of the canal and into the vestibule, where they do not cause symptoms. Contraindications Severe neck disease, high-grade carotid stenosis, and unstable heart disease. Oscillation is not used when perilymph fistula is suspected or there is a history of retinal detachment. [IV] Problems When moving material out of the posterior canal, there is a chance that it will relocate into another canal (on the same side). The most frequently encountered conversion will be from posterior to horizontal semicircular canal. This is more likely to occur if the head is not maintained in the proper position when the patient is brought upright. The head on body orientation should remain constant, turned 90° away from the affected ear. If particles do enter the horizontal canal, it may be treated using the appropriate maneuver described below. If post-treatment instructions are used, no treatment may be required. Main side effects Patients may become nauseated and vomit after Dix-Hallpike manoeuvres, and may not tolerate a CRP. In these instances, there is no reason not to have the patient take an antiemetic prior to treatment.

The second method suggested is Liberatory (Semont) maneuver

[IV] STANDARD PROCEDURE

This manoeuvre was originally designed with the intent to dislodge particles stuck to the cupula, however, it is effective in treating PSC BPPV due to canalithiasis. It must be performed rapidly, and patients must be able to be moved quickly from one side-lying position to the other. It has been found to be equally effective as the Epley manoeuvre. [V] Contraindications This manoeuvre requires a brisk movement of the patient, and any orthopaedic condition that limits patient mobility may be a relative contraindication. Complications When moving material out of the posterior canal, there is a chance that it will relocate into another canal (on the same side). The most frequently encountered conversion will be from posterior to horizontal semi

circular canal. This is more likely to occur if the head is not maintained in the proper position when the patient is brought upright. The head on body orientation should remain constant, turned 90° away from the affected ear. If particles do enter the horizontal canal, it may be treated using the appropriate manoeuvres described below. If post-treatment instructions are used, no treatment may be required. Special points Factors for success include use of IR video goggles for monitoring exactly what is going on throughout the manoeuvres; repetition of the manoeuvres at the same visit until nystagmus is cleared; timing of the manoeuvres



relative to the induced nystagmus;

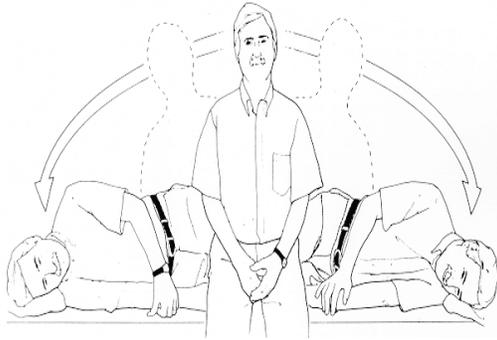
And judicious use of oscillation (discussed below). Bilateral BPPV is treated sequentially; therefore, a CRP is performed for the more symptomatic side, and on a return visit, if the treated side has resolved the fellow ear may be treated. Cost/cost effectiveness Treatment is free, in that this manoeuvre may be included as a part of the clinician's routine examination of the patient. Diagnosis and treatment of this condition may both be performed at bedside during an initial visit, without the use of blood or radiographic studies. Many authors recommend the use of an IR video system for monitoring eye movements during positioning, but this equipment is by no means necessary for accurate diagnosis and successful treatment in the vast majority of cases, making this type of treatment highly cost effective.

The Third suggested method is Positional test for horizontal canal BPPV

The diagnostic manoeuvre used to elicit BPPV emanating from a horizontal canal is the same used to look for positional nystagmus: the supine patient's head is rotated first to one side, then the other, and the eyes observed for evidence of a horizontal nystagmus. If significant horizontal nystagmus occurs without the subjective experience of vertigo, a central cause of positional nystagmus should be suspected. Standard procedure The treatment for HSC BPPV is a manoeuvre in which the head is first pitched chin down to bring the plane of the HSC perpendicular to the earth, while the patient is supine. The head and body are then rotated together toward the unaffected side. Complications Nausea, vomiting, and vertigo during the procedure. Special points Factors for success include use of IR video goggles for monitoring exactly what is going on throughout the manoeuvres; repetition of the manoeuvres at the same visit until nystagmus is cleared; timing of the manoeuvres relative to the induced nystagmus; and judicious use of oscillation (discussed below). Bilateral BPPV is treated sequentially; therefore, a CRP is performed for the more symptomatic side, and on a return visit, if the treated side has resolved the fellow ear may be treated. Cost/cost effectiveness Treatment is free, in that this manoeuvre may be included as a part of the clinician's routine examination of the patient. Diagnosis and treatment of this condition may both be performed at bedside during an initial visit, without the use of blood or radiographic studies. Many authors recommend the use of an IR video system for monitoring eye movements during positioning, but this equipment is by no means necessary for accurate diagnosis and successful treatment in the vast majority of cases, making this type of treatment highly cost effective.

The fourth Method suggested if Brandt-Daroff exercises

[VI]These exercises are reserved for patients who either fail or cannot tolerate either of the canalith



repositioning procedures mentioned above, and may be used for any affected canal. They may be performed safely at home, and do not require a skilled practitioner. For patients with recurrent BPPV, we treat with a CRP, and then have patients perform Brandt-Daroff exercises daily, each morning, for prophylaxis against further episodes. These exercises are also useful in habituating the phobic responses, which commonly develop in patients with a predisposition for, or concurrent anxiety disorder. This position is maintained until the precipitated vertigo subsides, or at least for 30 seconds. The patient then returns to the upright, and holds this position for an additional 30 seconds. The head is then turned in the opposite direction, and the same procedure is repeated on the other side. [VII]

OTHER EXERCISES.

These exercises were originally used in London in the 1950's to help rehabilitate patients after labyrinthectomy operations. A labyrinthectomy is the deliberate destruction of the inner ear. It nearly always causes severe vertigo. The idea behind the exercises is a graded series of steps to help the brain compensate, or work around, the false information coming from the labyrinthectomised ear. The lack of any signal from one side, with normal signal from the other, is interpreted as a severe rotation.

- You should aim to spend about an hour a day doing the exercises.
- Start with the simple, easy ones and work up to the more difficult.
- It is better to split the time up into short sessions of five to ten minutes each.

- You will find that some of the exercises make you feel dizzy and sick. Don't worry, they are meant to, that is how they work.
- By working through the vertigo, you are training the brain to compensate for the faulty signal from the defective inner ear.
- You should concentrate and spend extra time on any of the exercises you find difficult - there's no gain without pain.
- But don't overdo it to the extent that you vomit - that might put you off doing any more.
- You don't need to go to the gym for any of the eye, head, sitting or standing exercises, but you might prefer to do so for those involving moving about.

Eye exercises

- Look up and down 20 times. Start slowly at first, then speed up.
- Look from one side to the other 20 times. Start slowly at first, then speed up.
- Hold up one finger at arm's length. Focus on it. Move it slowly in towards you and out again 20 times.

Head exercises

- With your eyes open, bend your head forwards, then backwards, 20 times. Start slowly at first, then speed up.
- As the dizziness improves, repeat the head exercises with your eyes closed.

Sitting exercises

- Shrug your shoulders 20 times.
- Turn your shoulders to the right and left 20 times.
- From the sitting position, bend down and pick up objects from the floor, and sit back up again. Repeat 20 times.

Standing exercises

- Move from sitting to standing up, and back again, with your eyes open, 20 times.
- Repeat with eyes closed.
- Throw a small ball from one hand to the other, above eye level, 20 times.
- Throw the ball from hand to hand at knee level, 20 times.
- Turn around 360 degrees on the spot, eyes open.
- Repeat with eyes closed.

Benign paroxysmal positional vertigo (BPPV) is a common type of vertigo caused by the accumulation of tiny particles in fluid in the semicircular canals of the inner ear. These three canals are used by the brain to detect head movement and help maintain balance and equilibrium. Patients with BPPV experience dizziness during certain movements.

A new treatment for BPPV, called the **Comprehensive Positional Management (CPM) system**, is being studied in research and clinical settings. In this procedure, the exact location of the particles is determined and the patient is positioned manually to help move the particles out of the semicircular canal.

According to the National Institute on Deafness and Other Communication Disorders (NIDCD), recent studies suggest that the vestibular system may play a significant role in regulating blood pressure. This research may provide important information about how to manage low blood pressure that occurs as the result of a change in position (condition called orthostatic hypotension) and also improve the understanding of balance disorders.

Other studies are focused on determining how the vestibular system is able to differentiate between types of movement (e.g., downward movement, side-to-side movement). **Genetic studies** also are being conducted to determine how certain genes affect vestibular system function and how inherited neurological conditions and hearing loss affect balance.

To fill the gap in the knowledge ,to bring awareness of the facts in the case of laymen & finally ,to initiate the further research in this area.[VIII]

YOGIC ASANAS FOR BALANCE DISORDER PATIENTS

Asanas are yogic postures which help to develop agility, vitality, balance endurance and relieves stress. All of these are very important for improving balance function. The simple asanas depicted below are recommended. It's always helpful to seek the guidance of a Yoga teacher or a physical instructor for learning asanas. Some pranayams like Ujjaya Pranayam,

Nadi Sodhana Pranayam, Bhastrika Pranayam, Sitali Pranayam are also recommended. For detailed methodology on the asanas and pranayams seek the guidance of a trained physical instructor or refer to "PHYSICAL THERAPY FOR BALANCE DISORDER PATIENTS" [IX]

CONCLUSION

Some of the remedies for the positional vertigo disorder patients based on their cognitive, cognitive and Physiotherapies. In the bright of the preceding, the following suggestions are communicated through this paper. [X]Vertigo and disequilibrium are common symptoms in a primary care practice. Since these symptoms can be associated with serious disease, it is important to evaluate them properly. Any disorder that interferes with the sensory function of vision, balance, or proprioception or that affects the coulometer control system can result in disequilibrium or vertigo. The history centers on establishing the underlying disease in these sensory systems or in the central mechanisms that mediate responses to these sensory systems. Implementing all suitable Physical, behavioral therapies to fix the problem, by using suggested methods and suitable equipment by which mal functioning of brain can be handled effectively. [XI]By doing Rehabilitation exercises effectively like *Epley maneuver*, *Comprehensive Positional Management (CPM) system*, *Liberatory (Semont) maneuver*, *Positional test for horizontal canal BPPV*, *Brandt-Daroff exercises* , with help of above mentioned equipment 90% of positional vertigo can be fixed.

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