# Vestibular Disorders Association

*A nonprofit organization dedicated to serving people with inner ear balance disorders*
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# Benign Paroxysmal Positional Vertigo (BPPV)

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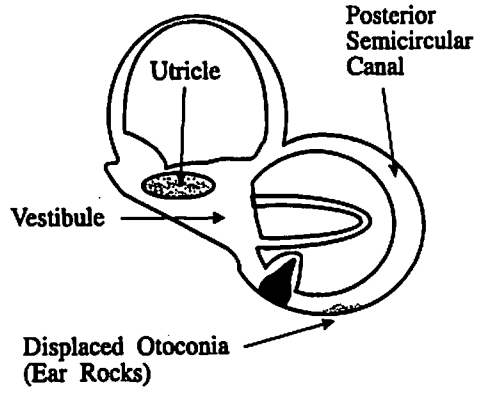
## What is BPPV?

A common cause of dizziness, benign paroxysmal positional vertigo (BPPV) is an inner ear balance disorder. It results in dizziness and other symptoms with certain head movements due to debris which has collected within a part of the inner ear.

The problematic debris, called otoconia, is made up of small crystals of calcium carbonate. This collection of displaced otoconia comes from damaged otolithic membrane in the utricle. With head movement, the displaced otoconia shift, sending false signals to the brain about spatial movement.




## Symptoms

The symptoms of BPPV include dizziness or vertigo, lightheadedness, imbalance, and nausea. Activities which bring on symptoms will vary in each person, but symptoms are almost always precipitated by a position change of the head with respect to gravity. This is because the displaced debris most frequently settles into the posterior semicircular canal.

Getting out of bed and rolling over in bed are two common "problem" motions. Some people feel dizzy and unsteady when they tip their heads back to look up. An intermittent pattern of these symptoms is usual. BPPV may last six weeks or it may last a lifetime. It can be highly disruptive to a person's life.

## Causes

About 20% of all dizziness is due to BPPV. The most common cause of BPPV in people under age 50 is head injury. BPPV is also associated with migraine.[1]

Degeneration of the vestibular system of the inner ear is the most common cause of BPPV among older people. BPPV becomes much more common with advancing age.[2] About 50% of dizziness in older people is due to BPPV.

In half of all cases, BPPV is called idiopathic, which means it occurs for no known reason. Viruses affecting the ear (such as those causing vestibular neuritis), minor strokes, and Ménière's disease are significant but unusual causes. Occasionally BPPV follows surgery, where the cause is considered to be a combination of the trauma on the inner ear during surgery and a prolonged period of supine positioning.[3]

## Diagnosis

A diagnosis is made based on a person's history, findings on physical examination, and the results of vestibular and auditory tests. Testing procedures for BPPV can include hearing tests and tests that look for the characteristic nystagmus (jumping of the eyes), such as the Dix-Hallpike test and electronystagmography (ENG). For diagnosis of BPPV with ENG, it is important to have the test done by a laboratory that can measure vertical eye movements. In addition, rotational chair testing may be used for difficult diagnostic challenges.

## Treatment

Motion sickness medications are sometimes helpful in controlling the nausea associated with BPPV but are otherwise rarely beneficial. However, various kinds of physical maneuvers and exercises are effective.[4] Methods used on an outpatient basis by trained physicians or therapists include particle repositioning maneuvers and vestibular rehabilitation exercises. In addition, habituation exercises can be done at home. Surgery is another treatment option.

Particle repositioning head maneuvers

The goal of BPPV head maneuvers is to move the detached otoconia out of one of the semicircular canals. These maneuvers involve a series of specifically patterned head and trunk movements. They can be performed in the doctor's office and take about 15 minutes to accomplish. They are very effective, with an approximate cure rate of 80%.[5] The recurrence rate for BPPV after these maneuvers is low. However, in some instances additional treatment(s) may be necessary.

There are two primary maneuvers: the Semont-Liberatory maneuver and the Epley maneuver. The choice of maneuver depends on results of the Dix-Hallpike test (revealing which canal is involved) and whether or not the otoconia are hung up on the cupula of the canal or inside the canal.

- The **Semont-Liberatory maneuver** involves a procedure whereby the patient is rapidly moved from lying on one side to lying on the other.[6] It is a brisk maneuver that is not currently favored in the United States, but it is 90% effective after four treatment sessions.

- The **Epley maneuver** is also called the *modified liberatory maneuver*. It involves sequential movement of the head into four positions, with positional shifts spaced roughly 30 seconds apart. Differing opinions exist about the benefits of using concurrent vibration during the Epley maneuver.[7]

Occasionally, when the Epley maneuver is being performed, neurological symptoms (e.g., weakness, numbness, and visual changes other than vertigo) occur, caused by compression of the vertebral arteries.[8] In this case, persisting with the maneuver can lead to stroke. But when the diagnosis of BPPV is well established, trained medical professionals can modify the exercises so that the positions are attained with body movements rather than head movements, thereby avoiding the problematic compression.

After a person is treated with either of these particle repositioning maneuvers, the treating specialist will provide specific instructions about activities and body positions to reduce the chance that debris might fall back into the sensitive back part of the ear until it either adheres or is reabsorbed.

Even with successful treatment with particle repositioning maneuvers, BPPV recurs in about one-third of patients after one year, and in about 50% of all patients treated after five years.[7,9,10] A recent review[11] assessed the effectiveness of the Epley maneuver and called for more study of the issue.

Vestibular physical therapy

Physical therapy exercises are designed to retrain the brain to recognize and process signals from the vestibular system in coordination with information from vision and proprioception. A trained vestibular

rehabilitation therapist will customize exercises to each individual's needs using an assessment of symptoms, balancing strategies, and limitations.

If the head maneuvers described in the previous section don't work, habituation exercises called the **Brandt-Daroff exercises** are sometimes recommended.[12] Through the repetition of certain movements, they reduce the vertiginous responses to these movements in 95% of cases. They can be done at home with the guidance of a doctor or physical therapist but are more arduous than the office treatments.

Surgery

When head maneuvers or vestibular rehabilitation exercises are ineffective in controlling symptoms, a surgical procedure called **canal plugging** is sometimes recommended. Canal plugging stops the movement of particles within the posterior semicircular canal so that false signals of movement are no longer sent to the brain from that canal, without affecting the functions of the other canals or parts of the ear. This procedure should not be considered until all three maneuvers or exercises (Semont, Epley, and Brandt-Daroff) have been attempted and found ineffective.[13,14] The surgery poses a small risk to hearing and is effective in about 90% of individuals who have had no response to any other treatment.

## Atypical BPPV

Several rarer variants of BPPV may occur spontaneously or after the Brandt-Daroff exercises, Epley maneuver, or Semont maneuver. They are mainly thought to be caused by migration of otoconial debris into canals other than the posterior canal. Atypical BPPV variants include lateral canal BPPV and anterior canal BPPV,[15] as well as possible multi-canal patterns.

Cupulolithiasis and vestibulolithiasis are other variants of BPPV. Cupulolithiasis is a condition in which debris is stuck to the cupula of a semicircular canal rather than being loose within the canal. It is not a treatment complication, but rather is part of the spectrum of BPPV. Vestibulolithiasis is a hypothetical condition in which debris is present on the vestibule side of the cupula rather than the canal side.

## Coping

Modification in daily activities also may be necessary to help cope with dizziness caused by BPPV. This may include using two or more pillows while in bed, avoiding sleeping on the "bad" side, rising slowly from bed in the morning, avoiding extending the head/neck to look up (e.g., looking up to a high cupboard shelf) or down (e.g., bending over to pick up something from the floor), and being careful when positioned in a dentist's or hairdresser's chair, when lying flat on the back, and when participating in sports activities.

## Where are BPPV evaluations and treatments performed?

Lists of specialists organized by U.S. state or world region are available from the Vestibular Disorders Association (VEDA). These lists include health professionals who have informed VEDA that they are specially trained to diagnose and treat BPPV, including performing in-office particle repositioning maneuvers.

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## Further reading

Some helpful documents available from the Vestibular Disorders Association include the following, identified by title and catalog number:

- *BPPV: What You Need to Know* (Book B-8)
- *Inner Ear Surgeries Meant to Control Vertigo/Disequilibrium* (Pub. T-6)
- *Resource Lists* (referral lists, Pub. F-15)
- *Vestibular Rehabilitation* (Pub. F-7)

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