

Northwestern University

BENIGN PAROXYSMAL POSITIONAL VERTIGO

In Benign Paroxysmal Positional Vertigo (BPPV) dizziness is thought to be due to debris which has collected within a part of the inner ear. This debris can be thought of as "ear rocks", although the formal name is "otoconia". Ear rocks are small crystals of calcium carbonate derived from a structure in the ear called the "utricle" (figure 1). While the saccule also contains

otoconia, they are not able to migrate into the canal system. The utricle may have been damaged by head injury, infection, or other disorder of the inner ear, or may have degenerated because of advanced age. Normally otoconia appear to have a slow turnover. They are probably dissolved naturally as well as actively reabsorbed by the "dark cells" of the labyrinth (Lim, 1973, 1984), which are found adjacent to the utricle and the crista, although this idea is not accepted by all (see Zucca, 1998, and Buckingham, 1999).

BPPV is a common cause of dizziness. About 20% of all dizziness is due to BPPV. The older you are, the more likely it is that your dizziness is due to BPPV, as about 50% of all dizziness in older people is due to BPPV. In a recent study, 9% of a group of urban dwelling elders were found to have undiagnosed BPPV (Oghalai, J. S., et al., 2000).

The symptoms of BPPV include dizziness or vertigo, lightheadedness, imbalance, and nausea. Activities which bring on symptoms will vary among persons, but symptoms are almost always precipitated by a change of position of the head with respect to gravity. Getting out of bed or rolling over in bed are common "problem" motions. Because people with BPPV often feel dizzy and unsteady when they tip their heads back to look up, sometimes BPPV is called "top shelf vertigo." Women with BPPV may find that the use of shampoo bowls in beauty parlors brings on symptoms. An intermittent pattern is common. BPPV may be present for a few weeks, then stop, then come back again.

WHAT CAUSES BPPV?

The most common cause of BPPV in people under age 50 is head injury. There is also an association with migraine (Ishiyama et al, 2000). In older people, the most common cause is degeneration of the vestibular system of the inner ear. BPPV becomes much more common with advancing age (Froeling et al, 1991). 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 such as those involving anterior inferior cerebellar artery (AICA syndrome), and Meniere's disease are significant but unusual causes. Occasionally BPPV follows surgery, where the cause is felt to be a combination of a prolonged period of supine positioning, or ear trauma when the surgery is to the inner ear (Atacan et al 2001). Other causes of positional symptoms are discussed here.

What doesn't cause BPPV ?

Gacek has suggested that BPPV is due to recurrent neuritis of the inferior vestibular nerve (Gacek and Gacek, 2002). We think that this is highly unlikely as BPPV is very well explained by mechanical consequences of loose debris within the inner ear, and not at all consistent with the usual picture of vestibular neuritis. BPPV is also not caused by psychological distress, and it is not a side effect of medication.

HOW IS THE DIAGNOSIS OF BPPV MADE?

Your physician can make the diagnosis based on your history, findings on physical examination, and the results of vestibular and auditory tests. Often, the diagnosis can be made with history and physical examination. Most other conditions that have positional dizziness get worse on standing rather than lying down (e.g. orthostatic hypotension). Electronystagmography (ENG) testing may be needed to look for the characteristic nystagmus (jumping of the eyes). It has been claimed that BPPV accompanied by unilateral lateral canal paralysis is suggestive of a vascular etiology (Kim et al, 1999). For diagnosis of BPPV with laboratory tests, it is important to have the ENG test done by a laboratory that can measure vertical eye movements. A magnetic resonance imaging (MRI) scan will be performed if a stroke or brain tumor is suspected. A rotatory chair test may be used for difficult diagnostic problems. It is possible but rather uncommon to have BPPV in both ears (bilateral BPPV).

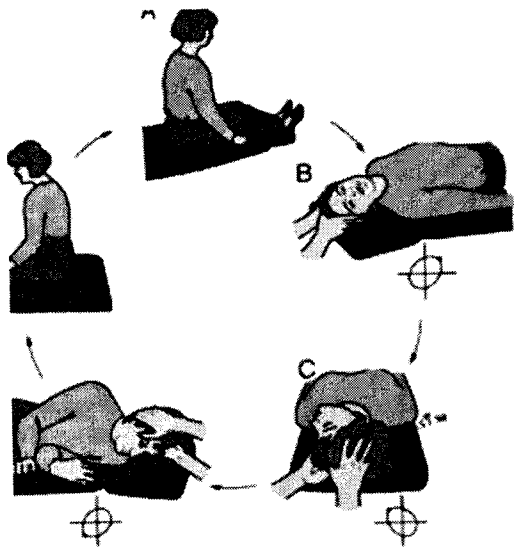
There are some rare conditions that have symptoms that resemble BPPV. Patients with certain types of central vertigo such as the spinocerebellar ataxias may have "bed spins" and prefer to sleep propped up in bed (Jen et al, 1998). These conditions can generally be detected on a careful neurological examination and also are generally accompanied by a family history of other persons with similar symptoms.

HOW MIGHT BPPV AFFECT MY LIFE?

Certain modifications in your daily activities may be necessary to cope with your dizziness. Use two or more pillows at night. Avoid sleeping on the "bad" side. In the morning, get up slowly and sit on the edge of the bed for a minute. Avoid bending down to pick up things, and extending the head, such as to get something out of a cabinet. Be careful when at the dentist's office, the beauty parlor when lying back having ones hair washed, when participating in sports activities and when you are lying flat on your back.

HOW IS BPPV TREATED?

- Office Treatment
- Home Treatment
- Surgical Treatment



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BPPV has often been described as "self-limiting" because symptoms often subside or disappear within six months of onset. Symptoms tend to wax and wane. 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 have proved effective. Three varieties of conservative treatment, which involve exercises, and a treatment that involves surgery are described in the next sections.

OFFICE TREATMENT OF BPPV: The Epley and Semont Maneuvers

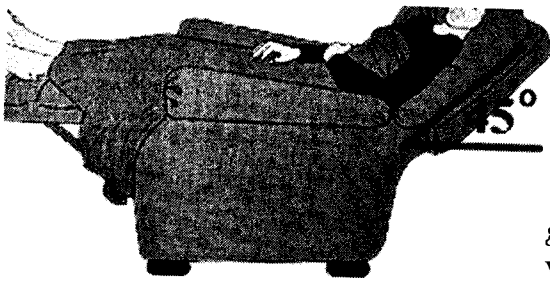
There are two treatments of BPPV that are usually performed in the doctor's office. Both treatments are very effective, with roughly an 80% cure rate, according to a study by Herdman and others (1993). If your doctor is unfamiliar with these treatments, you can find a list of knowledgeable doctors from the Vestibular Disorders Association ([VEDA](#)).

The maneuvers, named after their inventors, are both intended to move debris or "ear rocks" out of the sensitive part of the ear (posterior canal) to a less sensitive location. Each maneuver takes about 15 minutes to complete. The **Semont maneuver** (also called the "liberatory" maneuver) involves a procedure whereby the patient is rapidly moved from lying on one side to lying on the other. It is a brisk maneuver that is not currently favored in the United States.

The **Epley maneuver** is also called the particle repositioning, canalith repositioning procedure, and modified liberatory maneuver. It is illustrated in figure 2. [Click here for an animation.](#) It involves sequential movement of the head into four positions, staying in each position for roughly 30 seconds. The recurrence rate for BPPV after these maneuvers is about 30 percent at one year, and in some instances a second treatment may be necessary. While some authors advocate use of vibration in the Epley maneuver, we have not found this useful in a study of our patients (Hain et al, 2000). Some authors also suggest leaving out some of the positions in the Epley maneuver, especially position 'D'. We suggest that you avoid therapy using this methodology.

After either of these maneuvers, you should be prepared to follow the instructions below, which are aimed at reducing the chance that debris might fall back into the sensitive back part of the ear.

INSTRUCTIONS FOR PATIENTS AFTER OFFICE TREATMENTS (Epley or Semont maneuvers)



1. *Wait for 10 minutes after the maneuver is performed before going home.* This is to avoid "quick spins," or brief bursts of vertigo as debris repositions itself immediately after the maneuver. Don't drive yourself home.

2. *Sleep semi-recumbent for the next two nights.* This means sleep with your head halfway between being flat and upright (a 45 degree angle). This is most easily done by using a recliner chair or by using pillows arranged on a couch (see figure 3). During the day, try to keep your head vertical. You must not go to the hairdresser or dentist. No exercise which requires head movement. When men shave under their chins, they should bend their bodies forward in order to keep their head vertical. If eyedrops are required, try to put them in without tilting the head back. Shampoo only under the shower.

3. For at least one week, *avoid provoking head positions* that might bring BPPV on again.

- Use two pillows when you sleep.
- Avoid sleeping on the "bad" side.
- Don't turn your head far up or far down.

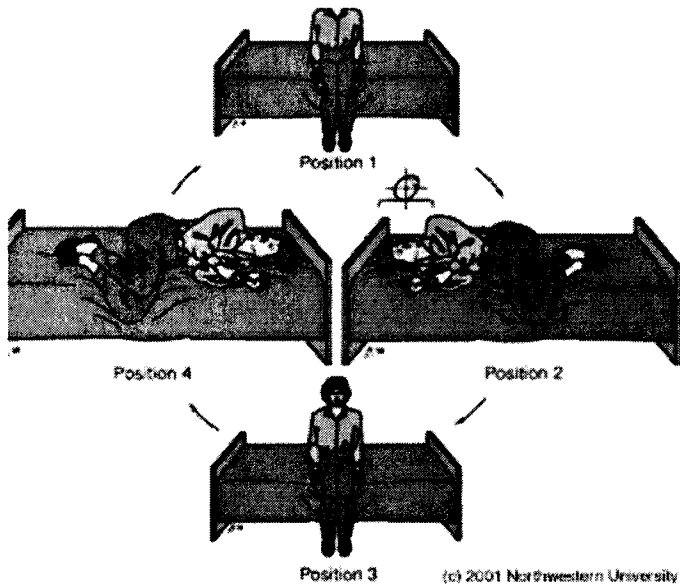
Be careful to avoid head-extended position, in which you are lying on your back, especially with your head turned towards the affected side. This means be cautious at the beauty parlor, dentist's office, and while undergoing minor surgery. Try to stay as upright as possible. Exercises for low-back pain should be stopped for a week. No "sit-ups" should be done for at least one week and no "crawl" swimming. (Breast stroke is OK.) Also avoid far head-forward positions such as might occur in certain exercises (i.e. touching the toes). Do not start doing the Brandt-Daroff exercises immediately or 2 days after the Epley or Semont maneuver, unless specifically instructed otherwise by your health care provider.

4. *At one week after treatment, put yourself in the position that usually makes you dizzy.* Position yourself cautiously and under conditions in which you can't fall or hurt yourself. Let your doctor know how you did.

Comment: Massoud and Ireland (1996) stated that post-treatment instructions were not necessary. While we respect these authors, at this writing (2002), we still feel it best to follow the procedure recommended by Epley.

WHAT IF THE MANEUVERS DON'T WORK?

These maneuvers are effective in about 80% of patients with BPPV (Herdman et al, 1993). If you are among the other 20 percent, your doctor may wish you to proceed with the Brandt-Daroff exercises, as described below. If a maneuver works but symptoms recur or the response is only partial (about 40% of the time according to Smouha, 1997),



another trial of the maneuver might be advised. The "habituation" exercises are also sometimes useful in the situation where all other maneuvers (Epley, Semont, Brandt-Daroff) have been tried -- in essence these consist of a more intense and prolonged series of positional exercises. When all maneuvers have been tried, the diagnosis is clear, and symptoms are still intolerable, surgical management (posterior canal plugging) may be offered.

BPPV often recurs. About 1/3 of patients have a recurrence in the first year after treatment, and by five years, about half of all patients have a recurrence (Hain et al, 2000; Nunez et al; 2000). If BPPV recurs, in our practice we usually retreat with one of the maneuvers above, and then follow this with a once/day set of the Brandt-Daroff exercises.

In some persons, the positional vertigo can be eliminated but imbalance persists. In these persons it may be reasonable to undertake a course of generic vestibular rehabilitation, as they may still need to compensate for a changed utricular mass or a component of persistent vertigo caused by cupulolithiasis. Fujino et al (1994) reported conventional rehab has some efficacy, even without specific maneuvers.

HOME TREATMENT OF BPPV:

BRANDT-DAROFF EXERCISES

[Click here for an animation](#)

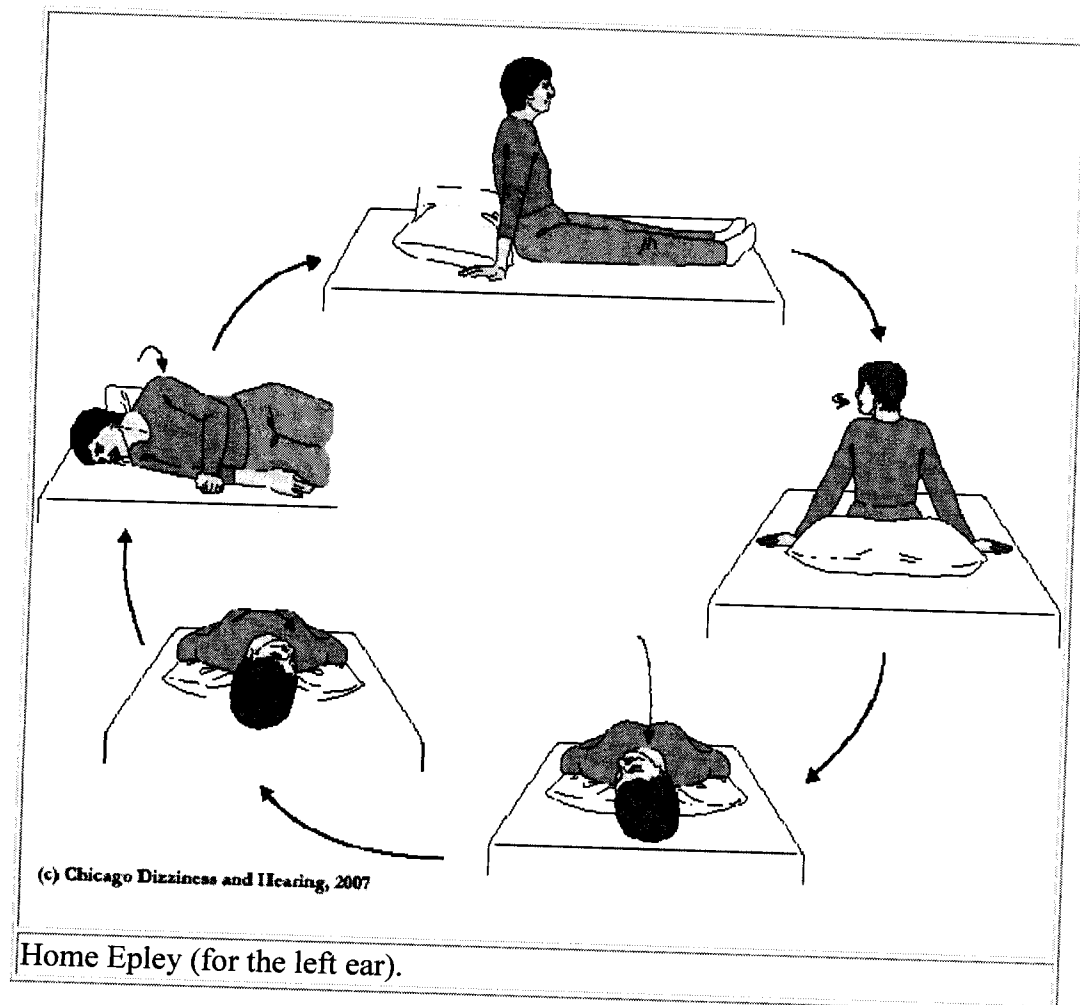
The **Brandt-Daroff Exercises** are a method of treating BPPV, usually used when the office treatment fails. They succeed in 95% of cases but are more arduous than the office treatments. These exercises are performed in three sets per day for two weeks. In each set, one performs the maneuver as shown five times.

1 repetition = maneuver done to each side in turn (takes 2 minutes)

Suggested Schedule for Brandt-Daroff exercises		
Time	Exercise	Duration
Morning	5 repetitions	10 minutes
Noon	5 repetitions	10 minutes
Evening	5 repetitions	10 minutes

Start sitting upright (position 1). Then move into the side-lying position (position 2), with the head angled upward about halfway. An easy way to remember this is to imagine someone standing about 6 feet in front of you, and just keep looking at their head at all times. Stay in the side-lying position for 30 seconds, or until the dizziness subsides if this is longer, then go back to the sitting position (position 3). Stay there for 30 seconds, and then go to the opposite side (position 4) and follow the same routine..

These exercises should be performed for two weeks, three times per day, or for three weeks, twice per day. This adds up to 52 sets in total. In most persons, complete relief from symptoms is obtained after 30 sets, or about 10 days. In approximately 30 percent of patients, BPPV will recur within one year. If BPPV recurs, you may wish to add one 10-minute exercise to your daily routine (Amin et al, 1999). The Brandt-Daroff exercises as well as the Semont and Epley maneuvers are compared in an article by Brandt (1994), listed in the reference section.



HOME EPLEY MANEUVER

The Epley and/or Semont maneuvers as described above can be done at home (Radke et al, 1999; Furman and Hain, 2004). We often recommend the home-Epley to our patients who have a clear diagnosis. This procedure seems to be even more effective than the in-office procedure, perhaps because it is repeated every night for a week.

The method (for the left side) is performed as shown on the figure to the right. One stays in each of the supine (lying down) positions for 30 seconds, and in the sitting upright position (top) for 1 minute. Thus, once cycle takes 2 1/2 minutes. Typically 3 cycles are performed just prior to going to sleep. It is best to do them at night rather than in the morning or midday, as if one becomes dizzy following the exercises, then it can resolve while one is sleeping. The mirror image of this procedure is used for the right ear.

There are several problems with the "do it yourself" method. If the diagnosis of BPPV has not been confirmed, one may be attempting to treat another condition (such as a brain tumor or stroke) with positional exercises -- this is unlikely to be successful and may delay proper treatment. A second problem is that the home-Epley requires knowledge of the "bad" side. Sometimes this can be tricky to establish. Complications such as conversion to another canal (see below) can occur during the Epley maneuver, which are better handled in a doctor's office than at home. Finally, occasionally during the Epley maneuver neurological symptoms are provoked due to compression of the vertebral arteries. In our opinion, it is safer to have the first Epley performed in a doctors office where appropriate action can be taken in this eventuality.



We offer a home treatment DVD that illustrates the home Epley exercises.
