



## SOARING Rx

BY DR. DANIEL L. JOHNSON &  
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# When the World Spins – (Medical) Vertigo

*What should the pilot decide about flying after having medical vertigo?*

### Dr. Jan's Experience:

After a normal night's sleep, I had awakened and lay in bed for a moment looking at the ceiling. Then I simply turned my head to the left, and all hell broke loose! The room started to spin with unbelievable violence. It was as if I was sitting on an office chair and some giant spun me around like a top. I could see the ceiling light race sideways, yet at the same time remain in place, in saccadic motions several times per second. I grasped the sheets in total panic. The swirling tapered down to nothing in about 15 seconds. This was followed by unpleasant nausea that took several

minutes to disappear. I was left with a profound feeling of disbelief, especially at the episode's intensity.

Had I had some kind of stroke? But I had none of the "FAST" stroke signs – asymmetric face or arm strength, or slurred speech. There had only been that powerful rotational feeling while completely still.

I found that I could reproduce it at will by turning my head left while lying on my back; and strangely, not by turning my head right. I could trigger a milder form by tilting my head down (tying shoe laces; don't do this standing up) or up (looking for coffee on a shelf). These episodes diminished in intensity in the following 3 days, then disappeared.

I discovered it to be "Benign Paroxysmal Positional Vertigo" (BPPV). I had thought of vertigo as mild light-headedness when staring down from great heights, not a violent rotational whirl. "Dizziness" also seems like a misnomer, because consciousness is totally lucid, nor is there mental confusion during an episode. You have to endure the episode fully.

Now I worry about flying: Might this happen when alone in a glider? We glider pilots seek turbulence in our quest for thermals. In these, we encounter random and sometimes severe g-forces, especially while continually turning one's head to check traffic and clouds.

This could trigger devastating vertigo. If I had been thermaling when I

had my violent BPPV episode, I could not have controlled the glider! This has created an unpleasant worry. I have grounded myself pending solutions.

What if it happened during a night flight in an airplane? For example, you could trigger BPPV by picking up a pencil that fell to the floor. Based on my personal brutal experience, I see this flight ending by spinning into the ground or losing a wing.

### The Word, *Vertigo*

DrDan here.

*Take no medication for this!* They impair mental function and do not help the condition (Dramamine, Antivert, etc.) Do not let your doctor prescribe medication for positional vertigo: It will be "medically disqualifying" and won't cure you.

We need to be clear about words. Both "vertigo" and "dizzy" have several meanings.

Vertigo's Latin root is *vertere*, to turn. All standard uses of *vertigo* or *vertiginous* relate to turning. "Giddy" and "dizzy" also once indicated a turning sensation, but have acquired vague meanings in the vernacular that include near-fainting, light-headed, confused, or silly.

*Medical* vertigo always refers to *turning* or *tumbling*. This typically is rapid, around one axis.

*Aviator's* vertigo refers to a powerful sensation of the aircraft turning when the panel instruments say it is not. This does not include rapid spinning. (When an aircraft "spins," it is not rotating rapidly nor steadily around a single axis.)

"Dizzy" has lost specific meaning in the vernacular. Sometimes extended questioning is needed to understand what someone means by "dizzy."

### Why?

The inner ear (the *vestibule*) has two sets of accelerometers.

One set is sensitive to linear acceleration. This is the *otolith apparatus*, made of tiny gel pads into which are stuck neural hairs, rate-sensitive to

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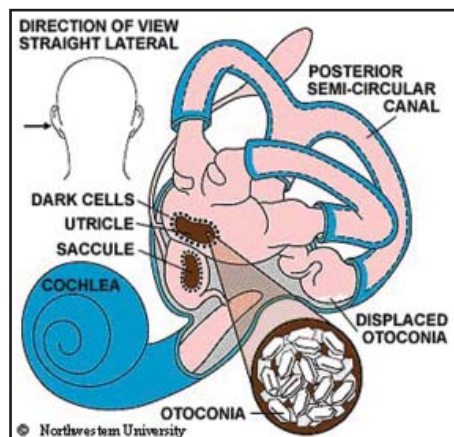


bending, surmounted by minuscule rocks (*otoconia*).

Linear acceleration moves the rocks, that slide the pads, that bend the hairs, which send a binary signal towards the brain.

The second set, the *semicircular canals*, is sensitive to *rotational* acceleration.

For a more complete discussion, go to <http://tinyurl.com/otolith>



Cartoon of inner ear. See <https://tinyurl.com/SpinRx> for detailed information on vertigo.

## The Cause of BPPV

As you may have noticed, nothing works as well when we are old. Stiff parts get floppy, elastic parts get brittle, and bits may fall off.

A bonk on the head can knock a rock off one of the otolith pads, or one might simply fall off. And then it wanders into the wrong room.

The problem is that the otolith apparatus and the semicircular canals share the same space – the dislodged pebble can migrate into one of the 3 semicircular canals (almost always the posterior one rather than the lateral or anterior canal) and stimulate it, causing it to send the only signal it can produce: I'm *spinning!* (The direction depends on which canal and which side of the head.)

BPPV is less simple than it was once thought to be. You can get involvement in any of the 3 canals – treatment varies with the canal involved. Also, you can have an otoconium that is either free floating in the ca-

nal or stuck to the cupula (what we call cupulolithiasis). Rarely, refractory BPPV requires surgery for control.

The fluid of the inner ear is as viscous as honey, so it will take a while for a tiny rock to move into one of the semicircular canals – or back out, after it's caused disturbance.

*Posterior* canal BPPV is most common, typically provoked by rolling over in bed, tilting the head up (e.g., to a shelf), or bending down (e.g., to tie shoelaces).

*Lateral* canal BPPV is 5-22% of cases. It tends to resolve spontaneously. It is most easily provoked by turning the head to one side while flat on one's back.

*Anterior* canal BPPV is only 1-3% of cases. It is most easily provoked by turning the head to one side while flat on one's back, and may feel like tumbling.

An airman who has BPPV has several options:

- Do nothing – most will resolve.
- Do some kind of repositioning maneuver (preferably in the hands of someone who knows what they are doing).

• See a specialist if the dizziness is severe.

The vertigo is *not* BPPV if:

- You have significant nausea with vomiting.
- Episodes last longer than seconds. Episodes lasting minutes are usually central.
- Your ears ring (tinnitus; **tin-i-tus**).
- You have hearing loss.

## Other Causes of Vertigo

*Peripheral vertigo:* Caused by any abnormality of the *inner ear*.

The inner ear has 3 different detectors that share space, fluid, and a cable toward the brain.

The *cochlea* is a helical tapered tube that (you engineers will want to know) does a Fourier transform on the sound entering the ear, parsing it by wavelength.

The *otolith apparatus* – the utricle and saccule – detects *linear acceleration*. It's the source of the trouble in BPPV.

The *semicircular canals* – 3 on each side, not quite lined up with the cardinal planes, detect *rotational acceleration*. They're the victim in BPPV.

Any abnormality that causes *asymmetry* in the signals from these will cause vertigo; its duration depends on the cause. Viral infections, Meniere's Disease (high pressure of the fluid of the inner ear), and strokes are examples of other causes of vertigo.

## Central vertigo.

The other group of causes of vertigo are in the nervous system – abnormalities of the nerves leading to the brain stem, within the brain stem, or the brain.

Strokes, viral infections, and tumors are some important causes.

## The difference, to you.

Vertigo that is not related to head movement is generally central. It is prolonged, at least *many* minutes. This warrants evaluation by a neurologist.

The vertigo of BPPV only lasts a few seconds or minutes and is exquisitely sensitive to head movement.

## What to Do?

I wish that I could tell you to just go see a doctor. My experience is that many don't recognize BPPV; even more don't know how to do the Epley maneuver that will quickly resolve it. The patient ends up with days to

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weeks of frustration and expense.

The truth is that you can try the Epley maneuver at home.

A very nice home-treatment method, with illustrations, is at <https://tinyurl.com/BPPV-treat>

Or you can try the Epley maneuver:

1: Sit *across* your bed, far enough onto it that when you lie on your back, your shoulders will be at the far edge and your head will hang over the edge.

Sit toward the foot of the bed, with pillows (head of the bed) in the direction that causes vertigo. This will help you sit up when you are done.

2: Swiftly lie back, head tilted over the edge, and turn your head in the direction that *causes* the vertigo, about 45° (that's about as far as it will go). You *will* get it. If you don't, your self-diagnosis is wrong.

3: *Wait* – hold that awkward position – until the vertigo is *completely* gone. It takes time for that minuscule pebble to creep through the molasses.

4: Then *turn* your head completely to the other – the good – side (45° or so). Now *hold* this position for at least a minute, and if this movement creates vertigo, hold the position until it's *completely* gone.

5: Then, holding your head turned, *roll* slowly toward that side until your nose is pointed *straight at the floor*. Hold this position for about a minute – if it causes vertigo, hold this position until the vertigo is *completely* gone.

6: Then *pull your knees toward your chest*, and then stick your legs out, off the foot of the bed, and use them to swing to a sitting position. Straighten your head, with it tilted forward.

Just sit there for at least a minute. If this movement causes any vertigo, wait until it's completely gone.

7: The textbook says that if the first try doesn't cure the vertigo, repeat 2 or 3 times.

My experience is that, if it's done s-l-o-w-l-y, waiting *at least* a minute in each position, a second time is seldom needed.

My experience is also that the victim *knows* whether it was successful.

If you aren't confident, nothing will be harmed if you do it again.

Do remember, the Epley maneuver only treats one semicircular canal; if you have BPPV and it doesn't work, then you'll need to see a dizzy-doc for a different maneuver.

### **An Anecdote About BPPV**

A favorite memory of BPPV is that one night at midnight I was called to admit to hospital an elderly woman who'd had a stroke.

She'd come to the ER in late afternoon with dizziness. No one had carefully inquired exactly what she had experienced, and 8 hours and \$5,000 in tests later, I met her. She was actually quite clear that her dizziness only happened when she turned her head to the left.

I performed the Epley maneuver for her right then. She said happily, "I'm cured!"

I said, "Do you want to go home now, or after breakfast?" We agreed that going home at midnight was inconvenient, and we should make sure we wouldn't have to repeat the exercise.

### **Now – Go to the Airport?**

Like Dr. Jan, pilots are not eager to jump into an airplane to test whether the cure worked. This is good judgment.

About a third of people have another episode of BPPV within the next year. Remember, we didn't take the pebble out, we simply moved it out of the way.

First, the FAA does not require medical evaluation or special issuance once the BPPV symptoms have resolved.

Second, I recommend that you can reassure yourself that the vertigo won't recur (*or that it will!*) simply by making the motion that incited it, once a week, until you're confident that it's not recurring.

### ***Preflight check!***

And I recommend that you make that movement part of your preflight checklist (before assembling!)

### **Frustrating Persistent Vertigo**

Vertigo can sometimes be difficult

to diagnose. Many physicians find it boring or frustrating. Only certain specialists are obligated to maintain current expertise in the complete evaluation of vertigo.

It's only the subspecialty of neurotology that actually loves to care for these patients (and provide accurate diagnoses and treatment). There are also some neurologists who like dizzy patients and market themselves as oto-neurologists.

A good resource for referral is the specialty website of otoneurology: <https://vestibular.org> can lead you to specialists of the Vestibular Disorders Association.

### ***Reference for further study***

Northwestern University sponsors a very detailed website on benign paroxysmal positional vertigo. Go to <https://tinyurl.com/SpinRx>.

### **Acknowledgements**

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Thanks to my favorite neurotologist, an anonymous aviation physician, who for years has been my go-to guy for dizzy pilots.

### **Contributors:**

*Jan Cocatre-Zilgien achieved the MD degree from the University of Paris, then took a sharp turn into insect neurobiology for a decade, then another sharp turn into software modeling in flight simulation. He holds a private pilot license for airplanes, seaplanes, and gliders. For his retirement, he was planning to fly his Russia AC-4B at the Illini Glider Club, until BPPV happened.*

*Dr. Dan Johnson is a has-been inter-nist and amateur soaring pilot who occasionally writes for this magazine. He discussed this topic in Soaring way back in June, 2015, but you may not have memorized that. The collection of his 66 columns is at <https://tinyurl.com/drdanscolumns> ➤*

