



Treatment of vertigo

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INTRODUCTION

Abnormalities of the vestibular system often result in vertigo, an illusory sense of motion of self or surround, which is associated with significant disability, including loss of work time and interruption of daily activities [1]. Vestibular vertigo may arise from peripheral lesions (eg, labyrinth or vestibular nerve) or central lesions (eg, brainstem or cerebellum).

Appropriate management of vertigo often requires the correct diagnosis. This includes identifying that the dizziness is due to a problem with the vestibular system and then determining the site and origin of that problem.

This topic will review the management of the patient with vertigo. Distinguishing vertigo from other types of dizziness, determining the cause of vertigo, and the differential diagnosis of vertigo are discussed separately. (See "[Approach to the patient with dizziness](#)" and "[Evaluation of the patient with vertigo](#)" and "[Causes of vertigo](#)".)

Vertigo treatment can be divided into three categories: those specific to the underlying vestibular disease, those aimed at alleviating the symptoms of vertigo, and those aimed at promoting recovery.

DISEASE-SPECIFIC TREATMENTS

Vertigo is caused by a number of conditions affecting either the peripheral vestibular apparatus in the inner ear or the central nervous system ([table 1](#)). (See "[Causes of vertigo](#)".)

In some cases, treatment of the underlying condition improves vertigo. In others, treatment does not improve symptoms but may be otherwise important for the patient's overall prognosis.

Treatment of the underlying disease may diminish the symptoms of vertigo or alter the disease course in the following conditions:

- Vestibular neuritis (see "[Vestibular neuritis and labyrinthitis](#)")
- Vestibular migraine (see "[Vestibular migraine](#)")
- Benign paroxysmal positional vertigo (see "[Benign paroxysmal positional vertigo](#)")
- Meniere disease (see "[Meniere disease: Evaluation, diagnosis, and management](#)")
- Multiple sclerosis (see "[Initial disease-modifying therapy for relapsing-remitting multiple sclerosis in adults](#)" and "[Treatment of secondary progressive multiple sclerosis in adults](#)")
- Vertebrobasilar ischemia (see "[Overview of secondary prevention for specific causes of ischemic stroke and transient ischemic attack](#)", section on 'Large artery disease')
- Herpes zoster (see "[Epidemiology, clinical manifestations, and diagnosis of herpes zoster](#)", section on 'Ramsay Hunt syndrome (herpes zoster oticus)' and "[Treatment of herpes zoster](#)")
- Perilymphatic fistula (see "[Causes of vertigo](#)", section on 'Perilymphatic fistula')
- Vestibular schwannoma (acoustic neuroma) (see "[Vestibular schwannoma \(acoustic neuroma\)](#)")
- Superior canal dehiscence (see "[Causes of vertigo](#)", section on 'Semicircular canal dehiscence syndrome')
- Episodic ataxia type 2 (see "[Overview of the hereditary ataxias](#)", section on 'Episodic ataxias')
- Cogan syndrome (see "[Cogan syndrome](#)")

SYMPTOMATIC TREATMENT

Medications to suppress vestibular symptoms are best used for alleviating acute episodes of vertigo that last at least a few hours or days. These drugs are not useful for very brief episodes

of vertigo, such as benign paroxysmal positional vertigo, except when the frequency of spells is very high.

Three general classes of drugs can be used to suppress the vestibular system and/or reduce associated nausea and vomiting ([table 2](#)) [2]:

- Antihistamines – [meclizine](#), [dimenhydrinate](#), [diphenhydramine](#)
- Benzodiazepines – [diazepam](#), [lorazepam](#), [clonazepam](#), [alprazolam](#)
- Antiemetics – [ondansetron](#), [prochlorperazine](#), [promethazine](#), [metoclopramide](#), [domperidone](#)

These medications are effective in ameliorating vertigo, especially in the acute setting, when concern for side effects is not paramount. Responses are generally dose related. Parenteral options are available for use in the emergency department setting when nausea and vomiting preclude oral administration.

The antihistamines are the drugs of choice in most patients; [meclizine](#) is the drug of choice in pregnancy [3]. Benzodiazepines can be sedating and are used when antihistamines are not adequately effective. The phenothiazine antiemetics (eg, [prochlorperazine](#), [promethazine](#)) are also more sedating and usually reserved for patients with severe vomiting. [Ondansetron](#), especially the oral disintegrating preparation, may also be helpful for nausea and vomiting associated with acute vertigo.

Other than sedation, which can be dose limiting, side effects of these medications are generally minimal. Extrapyrasidal symptoms are a risk with phenothiazine antiemetics and [metoclopramide](#).

Symptomatic treatments should be stopped as soon as possible after severe symptoms and vomiting cease (usually within one or two days) to avoid compromising long-term adaptation to vestibular loss by the brain [4-6]. Some studies in animal models have shown that use of these medications (benzodiazepines and phenothiazine antiemetics, in particular) are associated with impaired central vestibular compensation [5,7], but this has not been definitively confirmed in the human clinical setting [8,9].

VESTIBULAR REHABILITATION

Potential benefits — Studies in humans and animal models have shown that clinical recovery after peripheral vestibular injury occurs in advance of improved peripheral vestibular function,

suggesting that most of the early recovery and a substantial portion of the total recovery derives from central nervous system compensation [5,10-12]. This central compensation appears to be multisensory in its scope and is the primary target of vestibular rehabilitation [13]. There is some evidence that early rehabilitation is more effective than late intervention [14,15].

Vestibular rehabilitation (physical therapy) promotes recovery in patients with permanent unilateral or bilateral peripheral vestibular hypofunction [14,16]. It is not known whether vestibular rehabilitation is useful for central vestibular disorders, although preliminary evidence suggests that it might have benefit [17,18]. Referral can be arranged through most physiotherapy departments or dizzy clinics.

Most patients with vertigo prefer to lie with their head still. Vestibular rehabilitation forces them to perform challenging balance exercises with several potential benefits:

- Activity promotes adaptation – The brain can readjust or adapt its responses to take into account reduced vestibular input, particularly if one side is still normal. This is optimally accomplished when the brain has experience with vision during head motion, to determine how much error the lesion has introduced [19].
- Activity facilitates strategic substitution – There are other means of reducing spatial uncertainty, even if the vestibular system cannot recover. The cervico-ocular reflex can increase its input, and other eye movements can help stabilize gaze [20]. Alternative spatial cues from vision and proprioception can improve balance and walking.
- Inactivity has secondary negative effects – Patients may become physically deconditioned, which exacerbates the inadequacy of their postural reflexes. They may also become psychologically deconditioned, sometimes to the point where a "persistent postural-perceptual dizziness" (previously called phobic postural vertigo or chronic subjective dizziness) becomes the greatest obstacle to their recovery [21-24]. Fear of falling is particularly problematic in older adults after a vestibular event, and it can limit mobility indefinitely without a rehabilitation program [25].

Cause-specific efficacy — Vestibular exercises have been used for 60 years [26,27]. However, they have only more recently been studied in randomized, controlled trials. Limitations of these studies include that they are unblinded with short-term follow-up. The evidence of their benefit is most robust for unilateral peripheral vestibular disorders [28]. There is not sufficient evidence to determine whether one form of rehabilitation is more effective than another.

- **Acute peripheral vertigo** – The exercises commonly provided for persons with acute vestibular events include focusing on an object with a blank background and moving the head slowly to the right and left. The exercise is done in the pitch (up/down) and yaw (left/right) planes. Shortly after a vestibular injury the patient is encouraged to move his or her head slowly to avoid severe nausea. Then the speed is increased as the patient tolerates. Most patients are asked to perform these exercises two to three times each day for several minutes.

Randomized trials suggest that vestibular exercises begun shortly after the onset of acute unilateral vestibular hypofunction due to vestibular neuritis or vestibular surgery significantly improve balance at one to two months [29-34]. It is not known whether the improvements persist beyond one to two months.

- **Chronic peripheral vertigo** – The exercises recommended for persons with chronic peripheral vertigo are generally much more aggressive than those for persons with acute disorders. Patients are asked to perform eye and head movements while standing, walking forward, walking backward, and standing or walking on compliant or uneven surfaces. The focus of the program is to perform increasingly more difficult postural tasks with increasingly more eye and head movements while keeping symptoms manageable.

A study of patients with chronic dizziness for at least six months due to unilateral peripheral vestibular dysfunction found that dizziness improved with either vestibular therapy or drugs, but improved balance occurred only in the group receiving physical therapy [35].

Treatment with home exercises may be as effective as supervised outpatient therapy if exercises are selected and demonstrated by vestibular therapists [36-38]. Two randomized controlled trials of patients with chronic peripheral vestibular disorders in general practice evaluated a standard home vestibular program [36,37]. Treated patients had significant improvement on all primary outcome measures (dizziness, dizziness-related quality of life, and postural stability) compared with the control groups at three and six months of follow-up [14]. A limitation of these studies is that participants could not be blinded to treatment status. An online resource for home exercises is maintained by the [Vestibular Disorders Association](#).

- **Bilateral vestibular injury** – Complete bilateral loss of vestibular function reduces the possibility of adaptation, and patients often do not improve [39]. Nevertheless, exercises may promote strategic substitutions [40]. Saccadic eye exercises and exercises that attempt to optimize the efficacy of neck stretch receptors are emphasized in persons with

bilateral vestibular loss. If there is a possibility that the patient has any remaining vestibular function, a trial of vestibulo-ocular exercises is initiated as well.

Education about fall prevention is critical for persons with bilateral loss, as they have a particularly high fall risk [41]. Darkness and uneven surfaces will provide additional challenges for these patients.

A double-blind, placebo-controlled study found that physical therapy improved balance and gait speed in eight patients with bilateral vestibular injury, despite continued impairment of vestibular function [42].

- **Central vertigo** – Persons with central vestibular abnormalities often have constant symptoms. Gait and balance activities are emphasized along with eye and head movements. Most patients are instructed to perform these exercises two to three times per week. Nausea may be limiting; the use of medications in conjunction with physical therapy may improve participation and final outcome [43]. Adaptive methods to perform functional activities are often taught. Persons with central vestibular disorders take longer to improve than those with peripheral vestibular dysfunction [44,45]. For central disorders, only observational, uncontrolled reports are available to support the use of vestibular rehabilitation [17,18].

In summary, most agree that vestibular exercises can improve dizziness and postural confidence in the short term. We refer our patients to therapists trained in vestibular rehabilitation to develop customized exercise programs.

Ideally, exercise regimens should begin immediately after symptom onset because of evidence of a critical period of adaptation and compensation that is seen in animal studies [5,46]. Small studies in patients with unilateral peripheral vestibular hypofunction also suggest that there may be a critical period within the first weeks to one month for patients to achieve an optimal benefit with rehabilitation [47,48].

Further studies are needed to determine whether the gains obtained from vestibular rehabilitation are maintained in the long term, and whether such long-term gains are significant and relevant in regard to decreasing the risk of falls, improving gait, and promoting normal lifestyles.

PSYCHIATRIC COMORBIDITY

Psychiatric comorbidity is common in patients with vertigo. In one cross-sectional study, psychiatric disorders were diagnosed in more than 40 percent of patients with a diagnosed condition producing vertigo and were a significant contributor to disability [49]. The prevalence of psychiatric comorbidity (in particular, anxiety, somatoform, and affective disorders) was higher for some conditions (eg, 50 percent in vestibular migraine) than others (eg, 37 percent for vestibular neuritis). While the effects of psychiatric treatment have not been specifically studied, it is reasonable to consider psychiatric treatment and/or referral for patients with prominent psychiatric symptoms.

INFORMATION FOR PATIENTS

UpToDate offers two types of patient education materials, "The Basics" and "Beyond the Basics." The Basics patient education pieces are written in plain language, at the 5th to 6th grade reading level, and they answer the four or five key questions a patient might have about a given condition. These articles are best for patients who want a general overview and who prefer short, easy-to-read materials. Beyond the Basics patient education pieces are longer, more sophisticated, and more detailed. These articles are written at the 10th to 12th grade reading level and are best for patients who want in-depth information and are comfortable with some medical jargon.

Here are the patient education articles that are relevant to this topic. We encourage you to print or e-mail these topics to your patients. (You can also locate patient education articles on a variety of subjects by searching on "patient info" and the keyword(s) of interest.)

- Basics topics (see "[Patient education: Vertigo \(a type of dizziness\) \(The Basics\)](#)")
 - Beyond the Basics topics (see "[Patient education: Vertigo \(Beyond the Basics\)](#)")
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SUMMARY AND RECOMMENDATIONS

- **Overview** – Vertigo treatment can be divided into three categories: those specific to the underlying vestibular disease, those aimed at the symptom of vertigo, and those aimed at promoting recovery.
- **Disease-specific treatment** – Because cause-specific treatments of vertigo can alleviate symptoms and affect short- and long-term prognosis, accurate diagnosis of the underlying etiology is an important first step in the treatment of vertigo. (See "[Evaluation of the patient with vertigo](#)" and "[Causes of vertigo](#)".)

- **Symptomatic treatment** – A variety of symptomatic treatments provide relief to acute symptoms ([table 2](#)). Doses should be started low and increased to positive effect or side effect. (See '[Symptomatic treatment](#)' above.)

We suggest stopping acute symptomatic treatments within 48 to 72 hours if the patient's symptoms allow (**Grade 2C**). Some data suggest that these medications interfere with central compensation and long-term recovery.

- **Vestibular rehabilitation**

- **Peripheral vestibular disease** – For patients with peripheral vestibular disorders, we suggest vestibular exercises to promote early recovery (**Grade 2B**).

Vestibular rehabilitation may be accomplished by a series of sessions with a physical therapist, or the patient may be trained to do these independently, at home. Some data suggest that early initiation of these treatments may maximize benefit. (See '[Vestibular rehabilitation](#)' above.)

- **Central vestibular disease** – We also suggest a trial of vestibular therapy in patients with central vestibular disorders (**Grade 2C**). There are few data regarding the benefit of therapy in these patients, but few other treatment options exist. (See '[Vestibular rehabilitation](#)' above.)

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Causes of vertigo

Peripheral causes
Benign paroxysmal positional vertigo
Vestibular neuritis
Herpes zoster oticus (Ramsay Hunt syndrome)
Meniere disease
Labyrinthine concussion
Perilymphatic fistula
Semicircular canal dehiscence syndrome
Cogan syndrome
Recurrent vestibulopathy
Acoustic neuroma
Aminoglycoside toxicity
Otitis media
Central causes
Vestibular migraine
Brainstem ischemia
Cerebellar infarction and hemorrhage
Chiari malformation
Multiple sclerosis
Episodic ataxia type 2

Medications for acute vertigo

Drug	Dose as-needed
Orally administered agents:	
Antihistamines, first-generation	
Dimenhydrinate	50 mg every 4 to 6 hours
Diphenhydramine	25 to 50 mg every 4 to 6 hours (maximum daily dose 200 to 300 mg)
Meclizine	12.5 to 50 mg every 6 to 12 hours (maximum daily dose 100 mg)
Benzodiazepines	
Alprazolam	0.5 mg immediate release every 8 hours
Clonazepam	0.25 to 0.5 mg every 8 to 12 hours
Diazepam	1 to 5 mg every 12 hours
Lorazepam	1 to 2 mg every 8 hours
<i>Benzodiazepines should not be used for more than 2 to 3 days for acute vertigo treatment</i>	
Antiemetics*	
Metoclopramide	5 to 10 mg every 6 hours
Ondansetron [¶]	4 mg every 8 to 12 hours
Prochlorperazine	5 to 10 mg every 6 hours
Promethazine	12.5 to 25 mg every 4 to 6 hours
Parenterally administered agents for acute emergency ward use:^Δ	
Antihistamines, first-generation	
Diphenhydramine	10 to 50 mg IV
Dimenhydrinate	50 mg IV
Antiemetics*	
Metoclopramide	10 mg IV
Ondansetron [¶]	4 to 8 mg IV
Prochlorperazine	2.5 to 10 mg IV
Promethazine	12.5 to 25 mg IM or IV (vesicant, use caution with IV administration; refer to drug monograph included within UpToDate)

Medications for treatment of acute vertigo. Doses listed are for non-volume depleted adult or adolescent patients with normal renal function. These agents may require dose adjustment in patients with reduced organ function (eg, kidney or cardiac disease) and in older persons. For specific recommendations, refer to the drug monographs included within UpToDate.

IM: intramuscular; IV: intravenous.

* Rare adverse cardiac reactions have been described with most antiemetics, particularly following parenteral use. These agents should be avoided in patients with known QT interval prolongation or other risk factors for torsades de pointes (TdP; eg, hypomagnesemia, hypokalemia). Refer to topic review of acquired long QT syndrome, section on drug-induced TdP within UpToDate. Phenothiazines and metoclopramide can cause extrapyramidal side effects (eg, akathisia, dystonia), particularly with parenteral use. Refer to accompanying text.

¶ Other serotonin 5HT₃ antagonist antiemetics (eg, dolasetron, granisetron) may be used if ondansetron is not available.

Δ If IV access is unavailable, these agents may be administered IM. However, with the exception of promethazine, IM use is not preferred due to injection site pain.

Contributor Disclosures

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