Dizziness: a diagnostic puzzle

A careful history and physical examination remain the cornerstones of efficient diagnosis. With a clear approach to the clinical evaluation of the dizzy patient, you can avoid ordering unreasonable, expensive, and uncomfortable tests.

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Physicians based in an emergency department, clinic, or office frequently hear patients complain of dizziness, but many of these physicians have difficulty diagnosing and managing these cases. The symptom of dizziness accompanies many different medical problems, involving any of several different organ systems.

CLASSIFICATION

The primary step in assessing the patient who presents with dizziness is to classify the case into one of three categories: near-syncope (or syncope), vertigo, or nonsyncope nonvertigo dizziness. This classification process, which relies solely on the clinical history, can be time-consuming and frustrating. Although many people have experienced dizziness at one time or another, they are limited by a paucity of English words to describe their sensations. They often resort to the use of vague terms, such as "lightheadedness" or "wooziness," or they may use specific terms such as "vertigo" or "seizure" incorrectly.

To gain a clear understanding of actual symptoms, ask the patient to elaborate on the initial description. A step-by-step account of the dizzy spell—from the point when the patient first noticed something wrong to the moment of resolution—often proves helpful. After the symptoms are related in the patient's own words, you might ask whether the dizzy sensation resembled that experienced upon standing up too quickly (near-syncope) or that experienced after stepping off a rotating amusement park ride (vertigo).

Many patients simply cannot provide a useful retrospective description of their symptoms. Nevertheless, it is often best to defer diagnostic tests until after you have obtained additional information. Patients may be instructed to keep a diary regarding their dizziness, including symptom precipitators (such as standing, lying, rolling to the side, turning the head, or experiencing emotional distress), alleviators (such as sitting, squatting, or lying down), the timing and duration of acute symptoms, and the presence of residual symptoms.

Potential witnesses may be enlisted to measure the patient's pulse rate, assist in answering diary questions, and describe any other observed features of an attack.

KEY PRACTICE POINTS

When a patient presents with dizziness, the first step is to classify the case as near-syncope (or syncope), vertigo, or nonsyncope nonvertigo dizziness.

◆

To understand actual symptoms, ask the patient to provide a step-by-step account of the dizzy spell—from the initial feeling that something was wrong to the moment of resolution.

◆

You can obtain additional diagnostic information by instructing the patient to keep a dizziness diary that records symptom precipitators, alleviators, the timing and duration of acute symptoms, and the presence of residual symptoms.

CHARACTERISTIC SYMPTOMS

Near-syncope. Symptoms of near-syncope usually appear over several seconds, although some patients describe their onset as instantaneous. The typical attack is manifested by dimming of vision, incoordination, confusion, pallor, and diaphoresis. Brief stiffening and incontinence may sometimes occur, mimicking seizures. Symptoms often develop after rapid assumption of the upright position and may persist while the upright position is maintained. Rapid improvement with sitting, squatting, or recumbency strongly suggests near-syncope.

Once symptoms begin to resolve,

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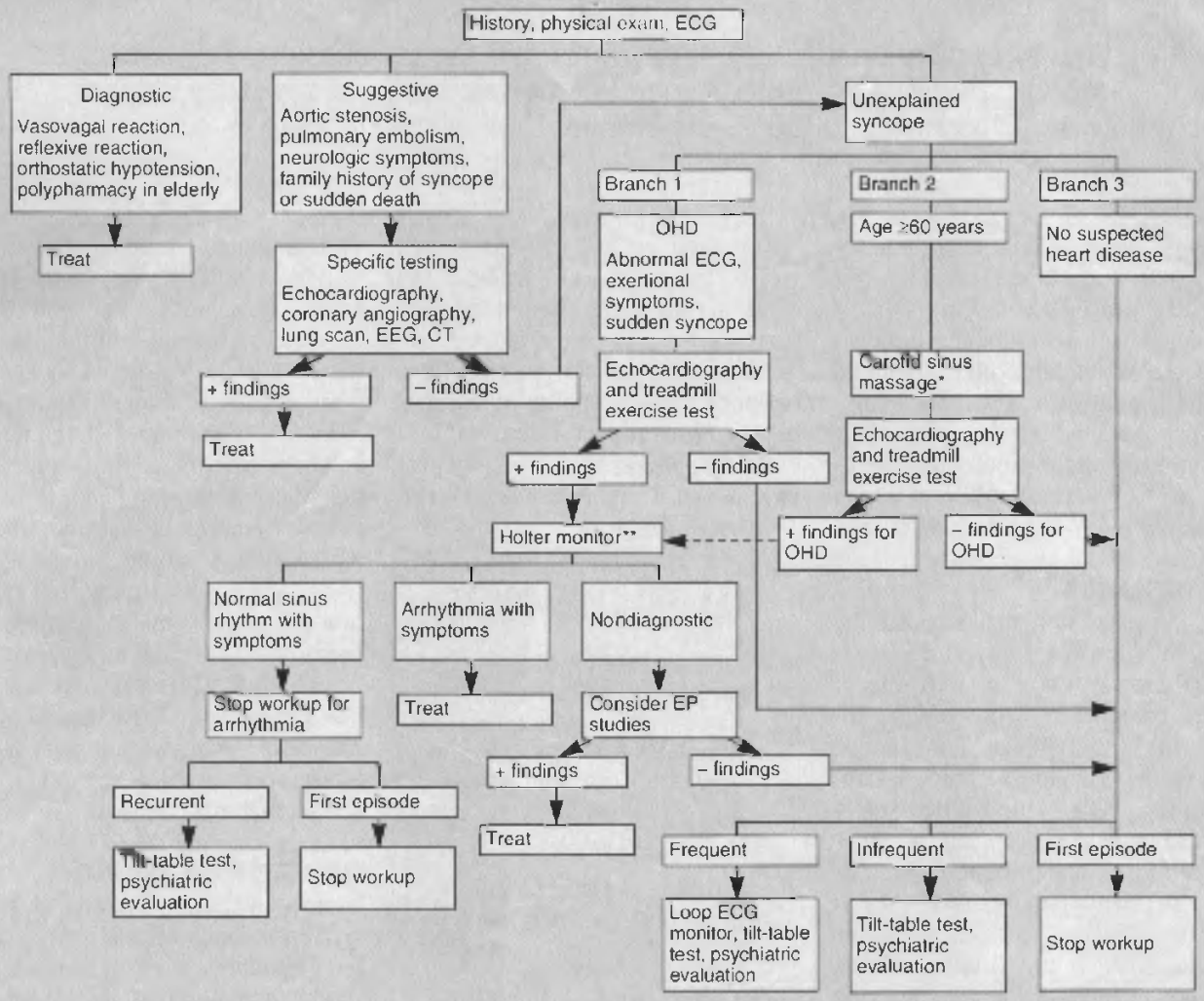
Figure 1. Diagnosing syncope



*Carotid sinus massage can be performed in an office setting only in the absence of bruits, a history of ventricular tachycardia, recent stroke, or recent myocardial infarction. Carotid hypersensitivity should be diagnosed only if clinical history is suggestive and massage is diagnostically positive (asystole ≥3 seconds, hypertension, or both).

** May be replaced by inpatient telemetry if there is concern about serious arrhythmia.

OHD = organic heart disease; ECG = electrocardiography; EEG = electroencephalography; CT = computed tomography; EP = electrophysiology

Adapted with permission from Linzer M, et al: Diagnosing syncope. Part II: Unexplained syncope. Ann Intern Med *127:76–86, 1997.*

patients usually regain normal alertness over several seconds to a few minutes. They may have a brief period of confusion afterwards, which is generally not prolonged and is much less profound than that occurring after a seizure.

Vertigo. With vertigo, patients have the sensation that they or their surroundings are spinning; they feel as though they have just stepped off a rotating amusement park ride. Symptoms may have an instantaneous onset, but they usually develop over a few seconds. Head movements, including the assumption of an upright position, often make the symptoms of vertigo worse. Patients typically become pale and may have symptoms of motion sickness, such as nausea, vomiting, headache, and fatigue. They may also experience gait changes, incoordination, loss of equilibrium, and/or blurred vision. Vertigo may be complicated by [illegible] flex hypotension (with near-syncope) or hyperventilation (with acral numb-

Table. Causes of dizziness

Near-syncope

- Autonomic failure
  - Autonomic neuropathy
  - Medications
- Cardiac
  - Arrhythmia (supraventricular and ventricular tachycardias, bradyarrhythmias)
  - Cardiac failure
  - Ischemia
  - Outflow obstruction (hypertrophic cardiomyopathy, myxoma)
  - Valvular disorder (aortic stenosis, mitral regurgitation)
- Hypovolemic
  - Blood loss
  - Dehydration
- Reflexive
  - Carotid sinus hypersensitivity
  - Coughing
  - Defecation
  - Emotional distress
  - Fainting
  - Micturition
  - Pain
  - Swallowing
  - Valsalva maneuver

Vertigo

- Central pathways
  - Ischemia
  - Multiple sclerosis
  - Tumor (astrocytoma)
- Eighth nerve
  - Ischemia
  - Tumor (acoustic neuroma, meningioma, metastatic carcinoma)
  - Vestibular neuritis
- Medication
- Physiologic (altitude, motion sickness)
- Somatosensory dysfunction
- Trauma (postconcussion syndrome)
- Vestibular apparatus
  - Endolymphatic fistula
  - Ischemia
  - Ménière's disease
  - Paroxysmal positional vertigo
  - Serous otitis media
  - Tumor (cholesteatoma, glomus jugulare)
- Visual dysfunction

Nonsyncope nonvertigo dizziness

- Drop attacks
- Hyperventilation
- Hypoglycemia
- Migraine
  - Somatization disorder
- Multiple sensory deficits
- Seizures
- Stroke

ness). The typical attack of vertigo resolves gradually, often with a prolonged residual sensation of queasiness and fatigue.

Nonsyncope nonvertigo dizziness. This diagnosis encompasses cases that do not fit the descriptions of syncope or vertigo. Patients with nonsyncope nonvertigo dizziness note vague disequilibrium that may worsen with ambulation and with attempts to perform visual, fine-motor, or balancing tasks in the upright position. Confusing visual and somatosensory inputs may aggravate symptoms. Even a detailed history often reveals few useful diagnostic clues.

DIAGNOSING NEAR-SYNCOPE

The diagnosis of syncope is described in Figure 1 (p 40).[1,2]

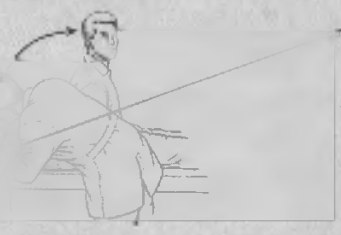
History. Once a patient's dizzy spells and symptoms appear to fit the category of near-syncope, the history should focus on possible causes (Table, above). Postural hypotension suggests hypovolemia or autonomic failure. Other possible precipitators of near-syncope include medications (some can lead to hypovolemia or autonomic reflex loss), coughing, micturition, defecation, swallowing, Valsalva maneuvers, pain, acute emotional distress, and head turning (associated with carotid sinus hypersensitivity or cerebrovascular insufficiency).

Some patients with cardiac arrhythmias may experience an unusually slow or rapid heart rate or palpitations at the onset of near-syncope; the presence of near-syncope while they are in a recumbent position suggests a cardiac arrhythmia. Fainting (vasovagal or vasodepressor syncope) occurs when blood vessels actively dilate, often accompanied by bradycardia. This may occur spontaneously or in association with emotion, pain, or fright.

Physical examination. The physical workup should include postural vital signs, cardiac evaluation, and carotid sinus massage. Patients with hypovolemia typically have blood pressure (BP) diminution but pulse acceleration; those with autonomic failure have a relatively low BP and a relatively slow pulse rate. Thorough cardiac evaluation should reveal any signs of valvular dysfunction or heart failure. You can diagnose carotid sinus

Figure 2. Hallpike-Dix maneuver

The Hallpike-Dix maneuver is a mandatory part of the physical examination of patients with vertigo.



The patient is shifted from sitting to supine with the head declined 45° and turned 45° to the side. This position is maintained for 30 to 60 seconds. The maneuver is then repeated with the head turned to the other side.

This maneuver aims to reproduce the classic symptoms of paroxysmal (benign) positional vertigo. Subjective symptoms are usually accompanied by marked rotatory nystagmus when the maneuver arrives at the critical head position.

hypersensitivity at the bedside by compressing each of the patient's carotid arteries (one at a time) with your fingers or stethoscope while listening for bruits; resulting pulse changes are best recorded on an electrocardiogram (ECG).

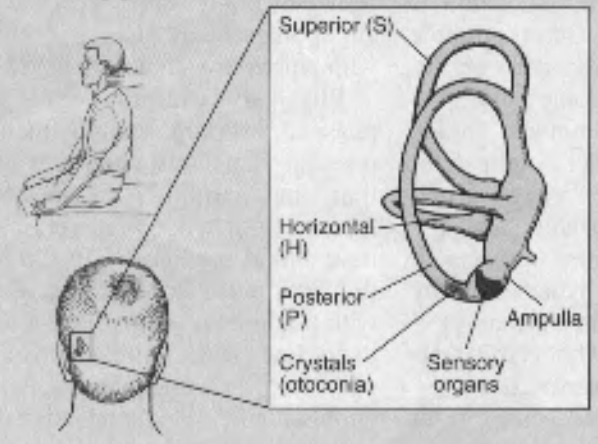
Carotid sinus massage is contraindicated in patients with bruits, a history of ventricular tachycardia, recent stroke, or recent myocardial infarction. Resuscitation equipment should be available, since the test may cause serious arrhythmias; however, the risk of stroke following carotid sinus massage appears to be quite small.

Additional workup. If the history and physical examination do not reveal an obvious cause of near-syncope, the patient should undergo further testing, beginning with a standard resting ECG. If the ECG is normal, further evaluation depends on the patient's risk of heart disease. Patients with known heart disease or those older than 60 years should undergo echocardiography and a treadmill exercise test. Patients with suspected heart disease should undergo 24-hour ambulatory ECG (Holter monitor) testing. A loop ECG monitor (a device that continuously records heart rhythms but saves data only when the patient signals that an event has occurred) may be needed if the symptoms are too infrequent to appear on the Holter monitor. Electrophysiologic studies are rec-

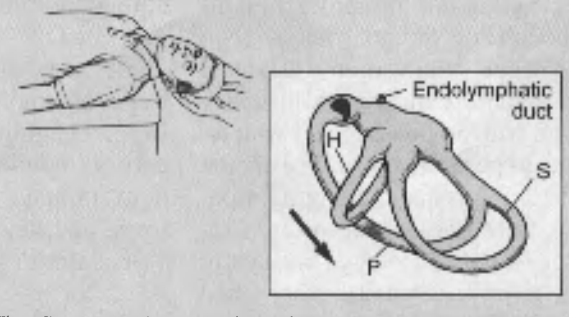
Figure 3. The Epley maneuvers

Have the patient sit on a table in a position that will allow the head to hang over the edge when the patient is laid down. Then take the patient through the following series of position changes. Support the head during these maneuvers and observe the eyes for nystagmus. Maintain each position until the patient is free of dizziness or nystagmus for 10 seconds. Those with training in this procedure may wish to use a vibrator on the head during these maneuvers to facilitate particle repositioning, but this is best avoided by others.

Starting position



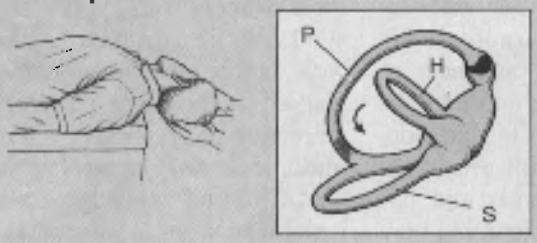
First position



The first position involves laying the patient flat on the table with the head tilted back at 45° toward the side of involvement (determined earlier with the Hallpike-Dix maneuver).

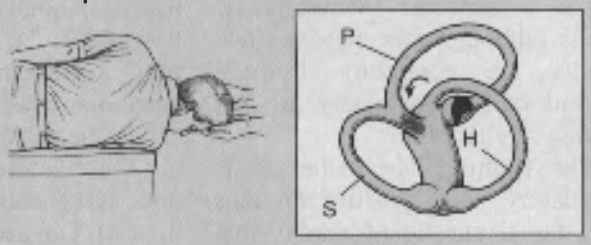
Figure 3, continued

Second position



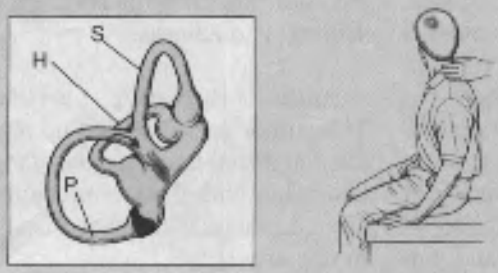
In the second position, rotate the head 45° to the opposite side while the head hangs over the edge of the table.

Third position



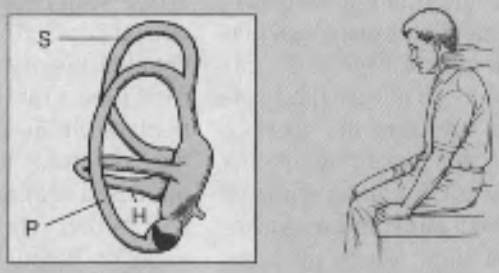
In the third position, roll the patient from the back to the side opposite the side of involvement. Keep the head turned 45°. At the end of this movement, the patient's head should be looking toward the ground.

Fourth position



In the fourth position, sit the patient up while keeping the head turned to the side.

Fifth position



In the fifth position, turn the head forward with the chin held downward at 20°.

After the maneuvers, advise the patient to keep the head above 45° for 2 days so the crystals will not migrate back into the posterior semicircular canal, causing a recurrence of symptoms.

Based on Epley JM.[5]

ommended if Holter monitor findings are inconclusive. In patients without suspected heart disease, recurrent events should be assessed by Holter monitor. Tilt-table testing may elucidate the cause of syncope in patients with normal Holter monitor findings.[3]

DIAGNOSING VERTIGO

History. Always ask about possible precipitators (Table, p 41). The onset or exacerbation of symptoms with particular head positions suggests paroxysmal (benign) positional vertigo (one of the most frequent causes), which is often severe initially. Since vertigo results from a mismatch of vestibular, visual, and somatosensory inputs, confusing ocular and peripheral sensory information (eg, the confusing visual information of waves or bobbing crowds, the confusing sensory information of walking on uneven ground or soft surfaces) may aggravate symptoms.

The presence of comorbid episodic tinnitus and hearing loss suggests Ménière's disease. Viral infection may precede vestibular neuritis. Brainstem stroke usually causes ipsilateral ataxia, but this can be confused with the disequilibrium experienced by all patients with vertigo. The presence of other neurologic symptoms supports the diagnosis of stroke. Vertigo related to peripheral vestibular disease is usually severe, whereas vertigo associated with central disease is often quite mild.

Physical examination. The physical workup should focus on the otologic and neurologic systems. A

careful examination of the ear may show local pathology. During otoscopy, insufflation may serve to diagnose a suspected endolymphatic fistula (although false-negative test results are common). Bedside screens of hearing acuity are not particularly helpful.

The Hallpike-Dix maneuver is mandatory, since positive findings may be diagnostic of paroxysmal (benign) positional vertigo (Figure 2, p 42).[4] In patients with positive test results, perform the Epley maneuvers[5] (Figure 3, pp 42–43) to alleviate symptoms. The Semont liberatory maneuvers[6] can be performed in addition to or as an alternative to the Epley maneuvers.

The patient with vertigo should undergo a complete neurologic examination. Vertigo is very rarely attributable to stroke in the absence of additional neurologic symptoms or signs such as contralateral loss of body pain and temperature sensation (but not light touch, position, or vibration), ipsilateral loss of facial pain and temperature sensation, Horner's syndrome, ipsilateral ataxia, asymmetric nystagmus, dysphagia, and hoarseness.

Additional workup. If the underlying diagnosis remains elusive following the history and physical examination, further evaluation is required. Magnetic resonance imaging (MRI) has become the preferred method of visualizing brainstem and auditory structures, since computed tomographic images of this region are often obscured by artifact. Pure-tone and speech audiometry may demonstrate "rollover" of speech discrimination (decreasing ability to discriminate spoken words as loudness increases [seen with central nervous system disease]), asymmetric hearing loss (suggesting eighth cranial nerve pathology), or fluctuating decreases in acuity for low tones (suggesting Ménière's disease).

Vestibular function tests (electronystagmography), rotational vestibular testing, and posturography may document the presence of vestibular dysfunction and may localize the dysfunction to one side, but these studies do not reveal the underlying cause. Rarely, the patient with an acoustic neuroma may have auditory evoked potential abnormalities in conjunction with normal findings on the MRI and audiometry.

DIAGNOSING NONSYNCOPE NONVERTIGO DIZZINESS

History. In patients presenting with nonsyncope nonvertigo dizziness, a detailed history can prove very informative (Table, p 41). Most patients suffering from hyperventilation syndrome are not aware of an increased respiratory rate, but many will report unilateral or bilateral acral or facial numbness and tingling, fatigue, weakness, and/or blurred vision. Patients with seizures rarely have dizziness as their sole symptom. To confidently diagnose stroke, you should identify additional neurologic symptoms or signs accompanying dizziness. Patients occasionally describe migrainous auras as bouts of dizziness. Visual and somatosensory alterations related to heights, changes in ocular refraction, or amusement park rides may lead to a mismatch of signals, resulting in dizziness.

"Dizziness" is rarely used to describe drop attacks, which consist of momentary loss of leg strength without loss of consciousness. Hypoglycemia is a very rare cause of dizziness in nondiabetics. This diagnosis requires that the symptoms be reproduced during periods of spontaneous hypoglycemia or during a glucose tolerance test.

Physical examination. The physical workup should include a 3-minute hyperventilation trial; most patients with hyperventilation syndrome experience symptoms well before the 3 minutes have elapsed. A thorough neurologic examination may show evidence of multiple sensory deficits or stroke.

Additional workup. Some patients who seem (on the basis of repeated episodes) to suffer from nonsyncope nonvertigo dizziness may actually have near-syncope or vertigo. These patients may benefit from ambulatory ECG monitoring, MRI, or audiometry. Electroencephalography may prove useful in the rare patient with seizures presenting as dizziness. □

Author's disclosure statement

The author has indicated no significant financial interest in or other relationship with the manufacturer of any commercial product discussed in this article.

References

1. Linzer M, Yang EH, Estes NAM, Wang P, et al: Diagnosing syncope. Part 1: Value of history, physical examination and electrocardiography. *Ann Int Med* 126:989, 1997. (For the Clinical Efficacy Assessment Project of the American College of Physicians)

2. Linzer M, Yang EH, Estes NAM, Wang P, et al: Diagnosing syncope. Part II: Unexplained syncope. *Ann Int Med* 127:76, 1997. (For the Clinical Efficacy Assessment Project of the American College of Physicians)

3. Sra JS, Anderson AJ, Sheikh SH, et al: Unexplained syncope evaluated by electrophysiologic studies and head-up tilt testing. *Ann Intern Med* 114:1013, 1991.

4. Mohr D: The syndrome of paroxysmal positional vertigo. *West J Med* 145:645, 1986.

5. Epley JM: The canalith repositioning procedure for treatment of benign paroxysmal positional vertigo. *Otolaryngol Head Neck Surg* 107:399, 1992.

6. Semont A, Freyss G, Vitte E: Curing BPPV with a liberatory maneuver. *Adv Otorhinolaryngol* 42:290, 1988.

Suggested Reading

Drachman D, Hart C: An approach to the dizzy patient. *Neurology* 22:323, 1972.

Herr R, Zun L, Mathews J: A directed approach to the dizzy patient. *Ann Emerg Med* 18:664, 1989.

Kroenke K, Lucas CA, Rosenberg ML, et al: Causes of persistent dizziness. A prospective study of 100 patients in ambulatory care. *Ann Int Med* 117:898, 1992.

Towler H: Dizziness and vertigo. *Br Med J* 288:1739, 1984.

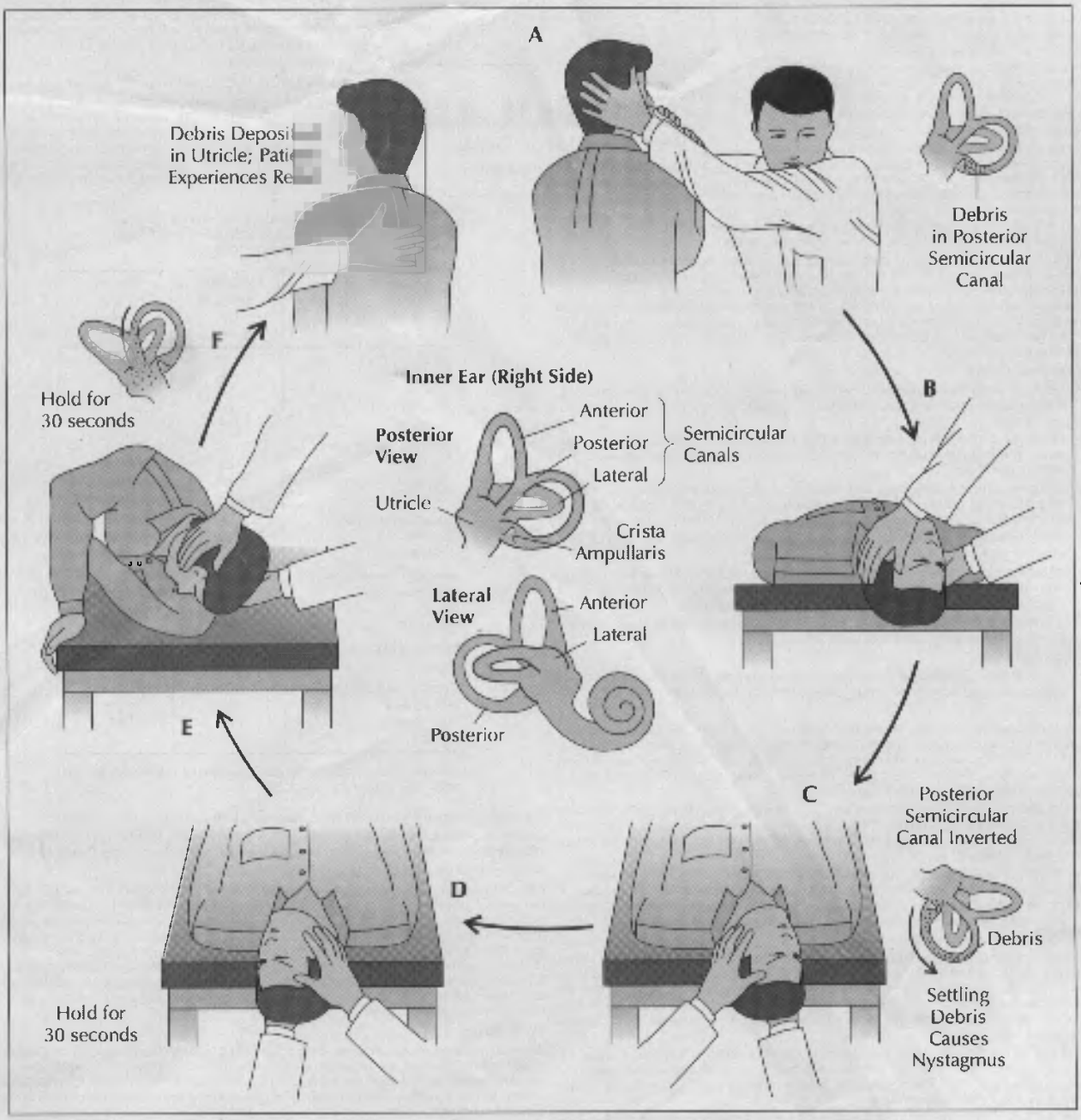


Figure 2. In the modified Epley maneuver, the patient's head is systematically rotated so that the loose particles slide out of the posterior semicircular canal and back into the utricle. The first step in the maneuver is the Dix-Hallpike test. If the vertigo affects the right ear, the patient is brought to the head-hanging position with the right ear turned downward (A-C). The physician then moves to the end of the table and rotates the patient's head to the left, with the right ear turned upward (D). The head is held in that position for 30 seconds. The patient then rolls onto the left side (E). Meanwhile, the examiner rotates the patient's head leftward until the nose points toward the floor. That position is also held for 30 seconds. Finally, the patient is lifted into the sitting position with the head facing left (F).