Vertigo

Definition:

Vertigo: the sensation of spinning or swaying caused by dysfunction of inner ear (peripheral) or central vestibular system (central) ,while stationary (at rest). may be spontaneous or triggered,It's often accompanied by pallor, sweating and vomiting.

Does vertigo the same as dizziness?

Dizziness is a vaguer term that, while it includes vertigo, may also refers to a sensation of discomfort in the head such as lightheadedness, disorientation, disequilibrium or imbalance.

Vertigo (subjective sensation),

The objective sign of vertigo is nystagmus (in which eyes make repetitive uncontrolled movements).

Causes of vertigo [5][6]

Type of vertigo	Definition	Diagnoses
Central vertigo	• Caused by central vestibular system (e.g., cerebellum, brainstem, vestibular nuclei) lesions or dysfunction	• Ischemia and/or hemorrhage of the vertebrobasilar circulation (i.e., ischemic stroke, hemorrhagic stroke, TIA) ◦ Lateral medullary (Wallenberg) syndrome [7] ◦ Vertebrobasilar insufficiency ◦ Cerebellar stroke ◦ Brainstem ischemia (e.g., basilar artery occlusion, vestibular nuclei stroke) • Posterior fossa tumors (e.g., vestibular schwannoma, meningiomas) [8] • Migraine (e.g., vestibular migraine, migraine with brainstem aura) • Demyelination (e.g., in multiple sclerosis) [7] • See also "Causes of central vertigo."
Peripheral vertigo	• Caused by inner ear (e.g., vestibulocochlear nerve, semicircular canals) lesions or dysfunction	• Vestibular neuritis and/or labyrinthitis • Meniere disease (from endolymphatic hydrops) • Benign paroxysmal positional vertigo (from semicircular canal debris) • Aminoglycoside toxicity • Perilymphatic fistula • Herpes zoster oticus • See also "Causes of peripheral vertigo."

Peripheral causes:

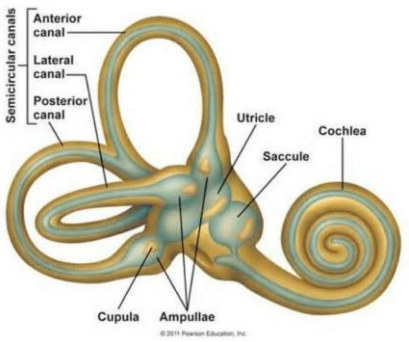
Body balance is maintained by the input to the brain from the inner ear, the eyes and the proprioceptive organs, especially of the neck so dysfunction of any of these systems may lead to imbalance. Peripheral causes arise from abnormalities in the peripheral vestibular system.

The vestibular system is situated in the petrous part of the temporal bone, in close proximity to the cochlea. It responds to movement of the head relative to space and gravity, using inertial-sensing receptors.

•THE VESTIBULAR SYSTEM CONSISTS OF TWO TYPES OF SENSORS:

.1The two otolith organs (the saccule and utricle) , which sense linear movement (translation).

.2A set of three semicircular canals, arranged at right angles to each other, sensing rotation movement in three planes.
-and the vestibucochlear nerve.



Benign paroxysmal positional vertigo (BPPV)

BPPV is due to a degenerative condition of the utricular neuroepithelium in which calcium carbonate crystals, otoconia/canaliths, that normally reside in the utricle of the ear are dislodged and end up in the semicircular canals, usually the posterior canal.

•At any age, but is most common between 50 and 70 years.

No obvious cause is found in 50% to 70% of older patients, and may occur spontaneously or following head trauma is a possibility in younger persons.
-Brief episodes of intermittent dizziness lasting seconds to hours.
Common triggers are head motion on change of body position (e.g., rolling over in bed) or looking upward

There are two main techniques used in the assessment and management of benign paroxysmal positional vertigo (BPPV):

-1The Dix-Hallpike Test is used for the diagnosis of BPPV.

-2 The Epley Manoeuvre can be used for its treatment once diagnosed.

Dix-Hallpike Maneuver

Tests for **canalithiasis** of the **posterior semicircular canal**, which is the m
common cause of benign paroxysmal positional vertigo (BPPV)

1. With the patient sitting up, turn the head 45 degrees to one side
2. Lie the patient down with head overhanging the edge of the bed and look for nystagmus
3. Repeat on the contralateral side

Positive if the maneuver **provokes paroxysmal vertigo and nystagmus**

Benign paroxysmal positional vertigo (BPPV)

TREATMENT:

(1canalith repositioning procedure such as the Epley maneuver which repositions the canalith from the semicircular canal into the vestibule. The success rate is approximately 70% 1st attempt, and 100% on successive maneuvers.

(2 Home treatment: Brandt-Daroff exercises can also be successful.

(3If there is no improvement with repeated repositioning maneuvers, or if atypical or ongoing nystagmus with nausea is present, another cause should be considered.

Epley Maneuver

Used to treat **benign paroxysmal positional vertigo** of the posterior or anterior canals

1
- Begin in upright sitting posture
- Legs extended
- Head rotated 45-degrees towards the side of positive Dix-Hallpike test

2

- Patient is quickly and passively forced down backwards into supine position
- Head held approx. in a 30-degree neck extension

3

- Observes patient's eyes for primary stage nystagmus
- Patient remains in this position for 1 - 2 minutes

4

- Patient's head rotated 90-degrees to opposite direction
- Patient remains in this position for 1 - 2 minutes

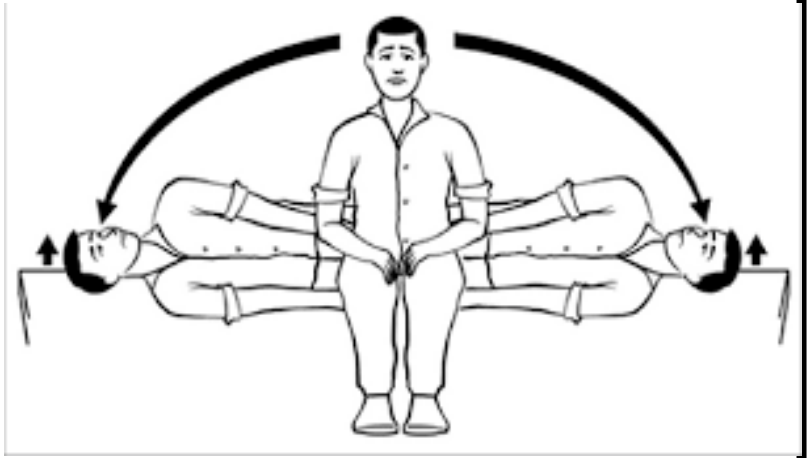
5

- Patient roles into shoulder, rotating head 90-degrees
- Patient now looking downward at 45-degree angle
- Observe for secondary stage nystagmus
- Remains in position for 1 - 2 minutes

6

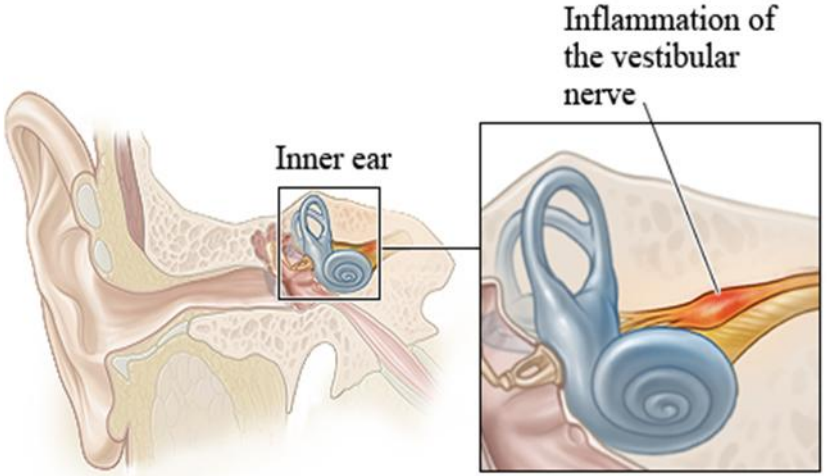
- Patient slowly brought upright, maintaining 45-degree rotation of head
- Patient holds seating position for 30 seconds

Home treatment: Brandt-Daroff exercises can also be successful, 5 times twice daily for two weeks.



Vestibular neuritis : the second most common cause of vertigo

- This is inflammation of the vestibular nerve, possibly due to viral infection which disrupts the transmission of sensory information from the ear to the brain.
- It can cause severe rotatory vertigo (longer than one day) with severe nausea and vomiting with apparent movement of objects in the visual field (oscillopsia), horizontally rotating spontaneous nystagmus to the non-affected side, or an abnormal gait with a tendency to fall to the affected side.
- It most commonly affects persons 30 to 50 years of age.
- ✓ Hearing is not impaired in this condition.
- ✓ Men = women



- ✓ As vestibular compensation occurs, the patient's vertigo resolves slowly over a few days.
- ✓ In 50% of patients, the underlying nerve damage may take two months to resolve. disequilibrium may persist for months.
- ✓ Reassurance, explanation, and advice are essential, in combination with symptomatic treatment for the first few days.

❖ Treatment :

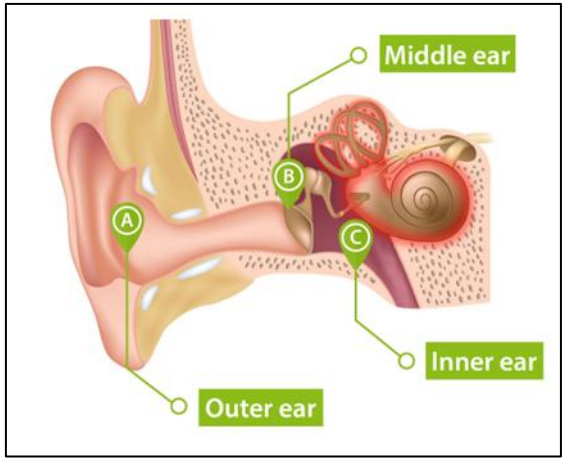
1. Vertigo and associated nausea or vomiting can be treated with a combination of antihistamine, antiemetic, or benzodiazepine.

- ✓ Antiemetics and antinausea medications should be used for no more than three days because of their effects in blocking central compensation.

2. Antibiotics or antiviral medications if caused by an underlying infection.

Labyrinthitis

- The inner ear is composed of the bony and the membranous labyrinth.
- Acute labyrinthitis is inflammation of this labyrinth.
- It presents with vertigo and hearing loss, preceded by a viral infection. Middle ear infections can spread to the inner ear and cause labyrinthitis.
- Vertigo is spontaneous, continuous, lasts from days to weeks



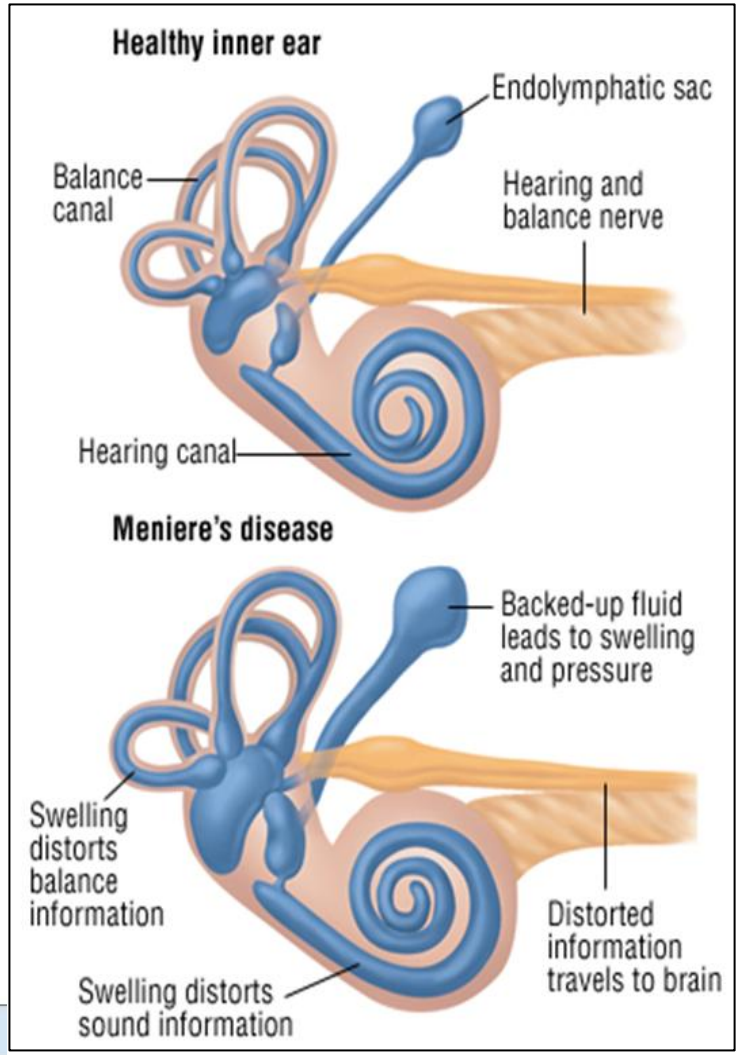
Vestibular neuritis (Labrynthitis)

- Duration?
  - ✓ Days to one week.
  - ➢ There is nausea , vomiting and fatigue.
- Treatment?
  - ✓ IV Fluids.
  - ✓ Steroids.
  - ✓ Anti-emetic.
- Etiology?
  - ✓ Viral infection.

Meniere's disease (endolymphatic hydrops)

- It's a condition of unknown etiology in which there's increased volume of endolymph (produced by the dark cells) in the semicircular canals leading to distention of the membranous labyrinth leading to inner ear dysfunction.
- Although it can develop at any age, it is more common between 20 and 60 years.
- Episodic spontaneous vertigo (at least two episodes lasting at least 20 minutes) associated with documented low- to medium frequency sensorineural hearing loss by audiometric testing in the affected ear (unilateral), tinnitus or aural fullness, nausea, vomiting and headache.
- Many patients report increased sensitivity to loud noises (recruitment) in addition to the listed symptoms.
- ✓ Psychological factors such as stress can act as a trigger mechanism for an attacks.

Triggers: *High salt intake, Chocolate, Alcohol, Smoking, Stress, Menstrual Cycle*



Meniere's disease

- There is tinnitus , Unilateral , fluctuating hearing loss for *low frequencies* and ear fullness.
- Tympanometry :Normal (Type A).
- Rinnie test : Positive.
- Weber test : Lateralized to the contralateral side.
- Hearing loss : Sensorineural.

- Etiology?
  - ✓ Idiopathic.
- Duration of vertigo?
  - ✓ 20-30 minutes to hours.

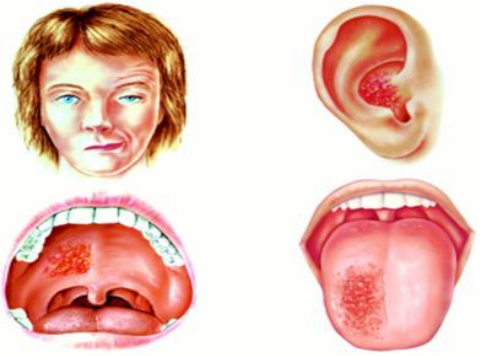
- Meniere's syndrome causes (different from Meniere's disease)?
  - ✓ Chronic otitis media.
  - ✓ Viral infection.
  - ✓ Syphilis.

Treatment

- **1st line :**
  - **Lifestyle changes, including limiting dietary salt intake, reducing caffeine intake, and limiting alcohol intake.**
- **2nd line :**
  - **Daily thiazide diuretic therapy can be added if vertigo is not controlled with lifestyle changes.**
  - **Betahistine hydrochloride (anti vertigo).**
- **3rd line :**
  - **Transtympanic injections of glucocorticoids and gentamicin can improve vertigo (ototoxicity).**
  - **Endolymphatic sac drainage or labyrinthectomy.**

Geniculate herpes zoster (Ramsay Hunt syndrome)

- Geniculate herpes zoster (Ramsay Hunt syndrome) usually causes vertigo along with facial palsy and severe pain in the ear.
- Caused by the reactivation of varicella zoster virus in the geniculate ganglion (a nerve cell band of the facial nerve).

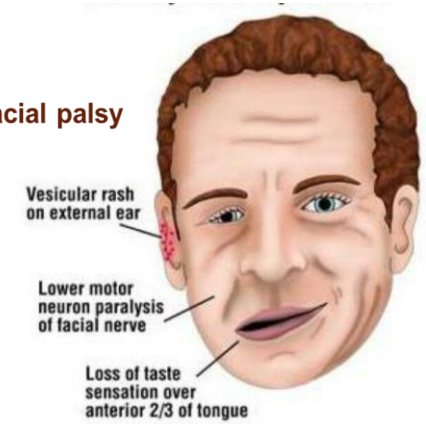


Signs and symptoms :

- Facial nerve paralysis
- Pain in the ear
- Taste loss in the front tow_thirds of the tongue
- Erythematous vesicular rash in the ear canal, tongue, and/or hard palate

Treatment :

prednisone + antiviral drugs (acyclovir)+ analgesia + eye care/ facial palsy



Comparing

Ramsay Hunt Syndrome with Bell Palsy

Symptoms	Ramsay Hunt Syndrome	Bell Palsy
Pain behind the ear	✗	✓
Severe ear pain	✓	✗
Paralysis of one side of the face	✓	✓
Fluid-filled blisters on the outside of the ear and in the ear canal	✓	✗
Hearing loss	✓	✗
Vertigo (a false sensation of moving or spinning)	✓	✗
Dry or watery eyes	✓	✓

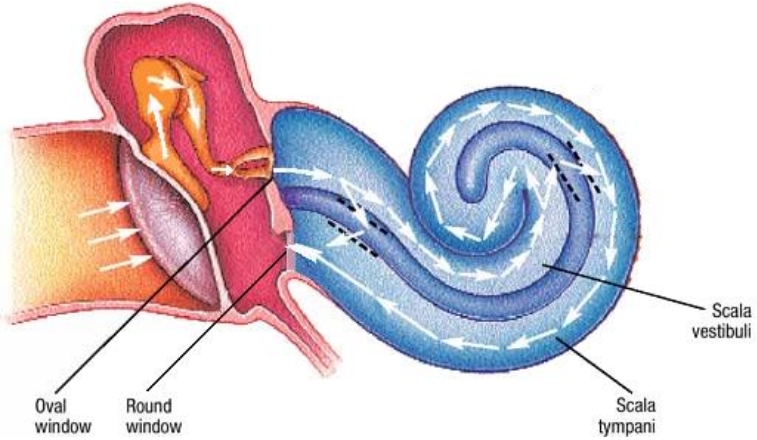
Perilymph fistula

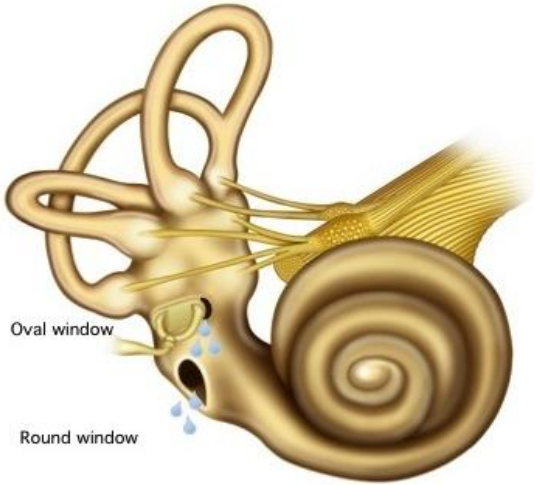
- It is a result of spontaneous rupture of the round-window membrane or trauma to the stapes footplate.
- As a tear in either one of membranes separate middle and inner ears
- Perilymph fistula causes marked vertigo with tinnitus and deafness.
- There is usually a history of straining, lifting or scuba diving in the spontaneous cases.
- Typically there is history of :

Head injury / middle ear surgery / event associated with increased intracranial pressure as coughing straining and sudden change in middle ear pressure / barotroma

❖ Treatment :

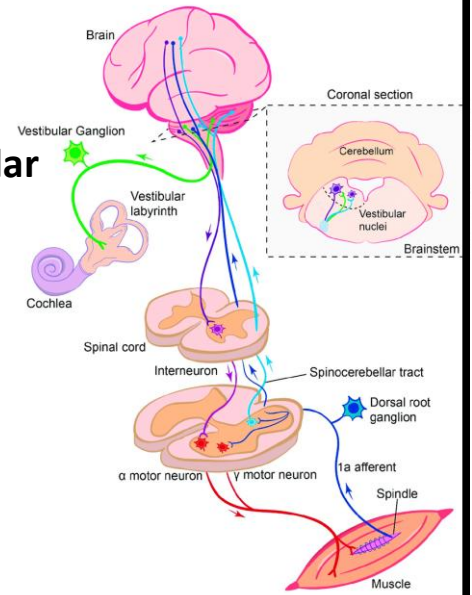
1. Bed-rest initially.
2. followed by surgical repair if symptoms persist.





Central causes

- **The vestibular nuclei, cerebellum, brainstem, spinal cord, and vestibular cortex make up the central vestibular system.**
- **May present with disequilibrium and ataxia rather than true vertigo.**
- **However, vertigo can be a presenting symptom of an impending cerebrovascular event.**



1. Vestibular migraine :

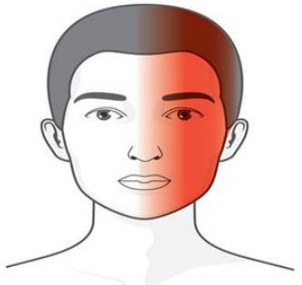
✓Episodic vertigo in a patient with a history of migraine headaches.

2. Vertebrobasilar insufficiency (ischemia) :

✓The blood supply to the brainstem, cerebellum, and inner ear is derived from the vertebrobasilar system.

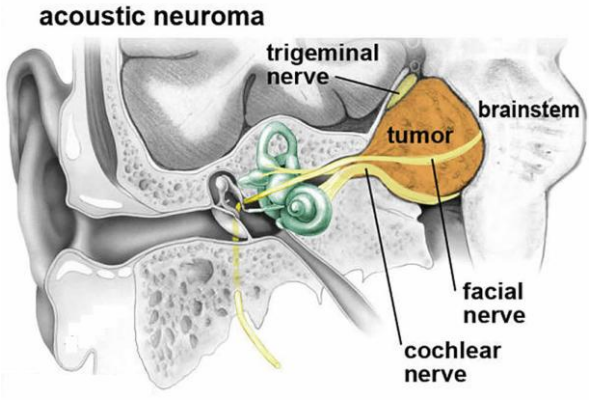
✓Vertebrobasilar insufficiency may cause momentary (very short duration) attacks of vertigo precipitated by neck extension.

✓Vertigo is the initial symptom in 48% of patients and diagnosis usually relies on a history of brainstem symptoms, such as diplopia, dysarthria, weakness, or clumsiness of the limbs.



3. Acoustic neuroma (vestibular shwannoma) :

✓ It is a slow-growing benign tumor of the vestibular nerve that causes gradual unilateral sensorineural hearing loss and slow loss of vestibular function and vertigo.



✓ Progressive Unilateral Sensorineural hearing loss for *high frequencies* with Tinnitus.
✓ The most common benign tumour in the cerebellopontine angle.
✓ 10% of vestibular schwannoma present with sudden hearing loss.
✓ 1% of sudden hearing loss are due to Vestibular schwannoma.

- Tympanometry?

✓ Type A.

- Rinnie test?

✓ Positive.

- Weber test?

✓ Lateralized to the contralateral side.

First nerve affected?

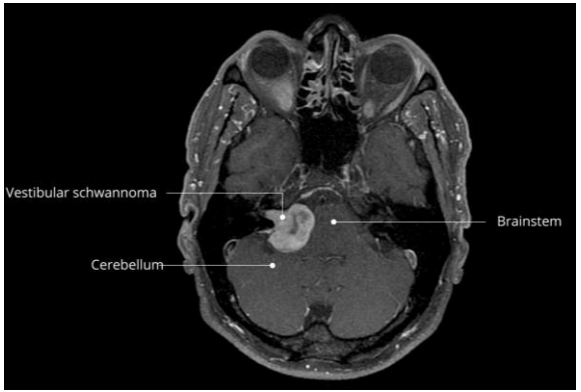
✓ Trigeminal nerve (absent or reduced corneal reflex).

Treatment:

1. Radiation (Gamma knife).
2. Surgery.

Complications of surgery?

1. Permanent hearing loss.
2. Facial nerve palsy.



General approach

- The diagnosis of the cause of vertigo or imbalance depends mostly on history, examination and little on investigation.

History :

Timing (onset, duration, and evolution of dizziness). Triggers (actions, movements, or situations) that provoke dizziness. Aural symptoms: deafness, fluctuating or progressive; tinnitus; earache discharge. Neurological symptoms: loss of consciousness, weakness, numbness, dysarthria, diplopia, fitting.

Physical Examination :

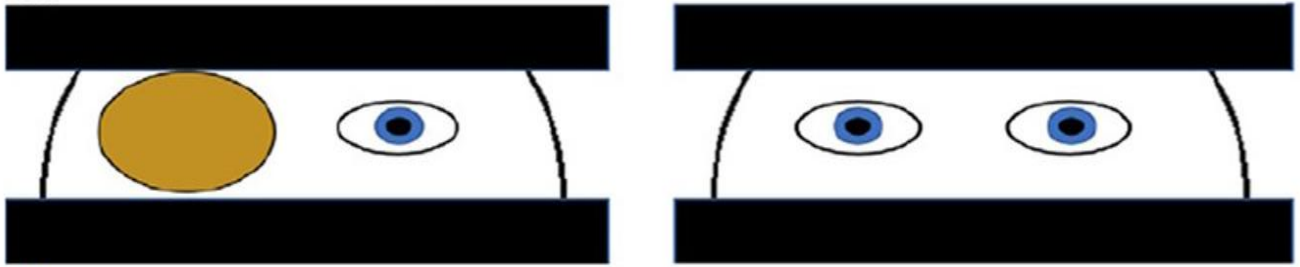
- Findings from the physical examination—including a cardiac and neurologic assessment, with attention to the head, eye, ear, nose, and throat examination.
- Blood pressure should be measured while the patient is standing and in the supine position. Orthostatic hypotension ?
- The use of the **HINTS (head-impulse, nystagmus, test of skew) examination** can help distinguish a possible stroke (**central cause**) from acute vestibular syndrome (**peripheral cause**)
- Rotation test and caloric reflex test

1) **Head-Impulse.** While the patient is sitting, the head is thrust 10 degrees to the right and then to the left while the patient's eyes remain fixed on the examiner's nose. If a saccade (rapid movement of both eyes) occurs, the etiology is likely peripheral. No eye movement strongly suggests a central etiology.

2) **Nystagmus.** The patient should follow the examiner's finger as it moves slowly left to right. Spontaneous unidirectional horizontal nystagmus that worsens when gazing in the direction of the nystagmus suggests a peripheral cause (vestibular neuritis). - Spontaneous nystagmus that is dominantly vertical or torsional, or that changes direction with the gaze (gaze-evoked bidirectional) central etiology

3) **Test of Skew.** Test of skew is assessed by asking the patient to look straight ahead, then cover and uncover each eye. Vertical deviation of the covered eye after uncovering is an abnormal result which is fairly specific for brainstem involvement.

3a.



3b.

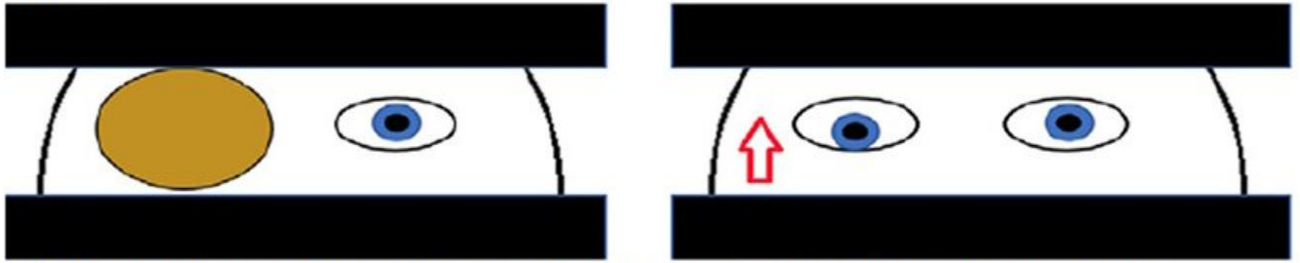
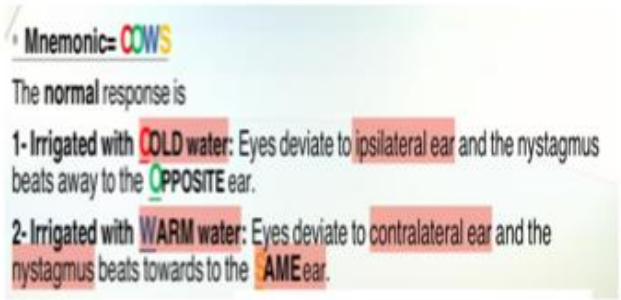


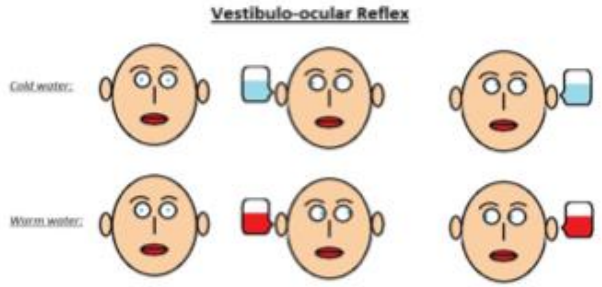
FIGURE 3. A test of skew with no verticla skew (3a) compared to one with a vertical skew that begins to correct when the eye is uncovered (3b).

The Caloric Reflex Test is used to test the Vestibulo–ocular reflex.

Procedure :

• Cold (30C) or warm water (44C) is flushed into the external auditory canal via a clean syringe. The difference in temperature between the water and your body generates convection signals in the in the endolymph of the Ear mimicking head rotation





Caloric reflex test Each ear washed for 40 seconds • Normal resultE ›nystagmus & vertigo last 90 sec • >90 sec ...hypofunction • no response.....dead ear

General Approach

Investigations 1 - Tests of vestibular system (balance) function include : • electronystagmography (ENG), • computerized dynamic posturography (CDP). 2- Tests of auditory system (hearing) function include • pure-tone audiometry, • speech audiometry, • acoustic-reflex, electrocochleography (ECoG), otoacoustic emissions (OAE), and auditory brainstem response test (ABR). 3- Other diagnostic tests include magnetic resonance imaging (MRI) and computerized axial tomography (CAT or CT).

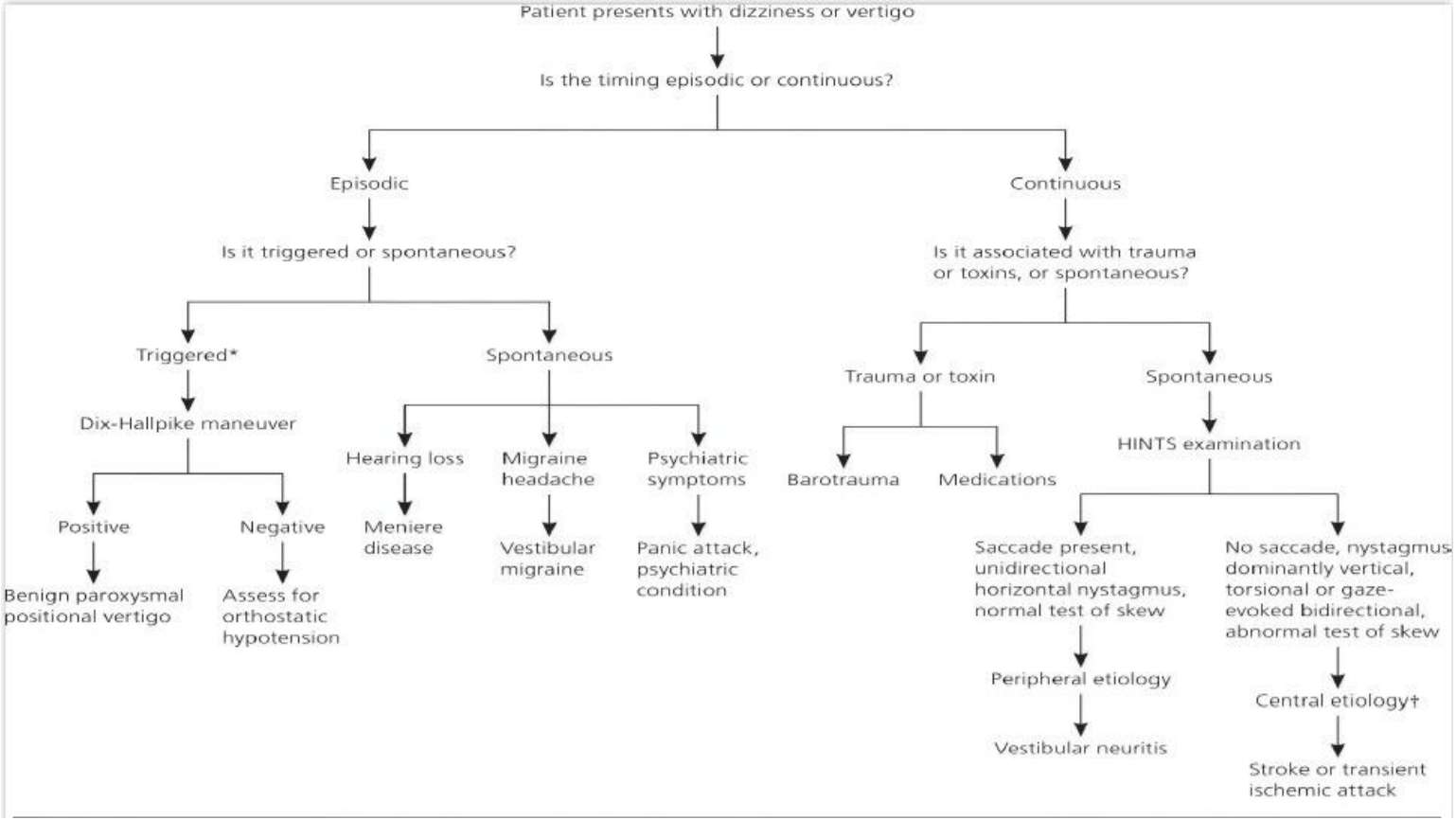
dizziness.

SO, Attention to the timing and triggers of dizziness is preferred over the symptom type because patients more consistently report this information **.eg:**

✔ **Episodic vertigo** triggered by **head motion** may be due to benign paroxysmal positional vertigo**(BPPV).**

✔ Vertigo with **unilateral hearing loss** suggests **Meniere disease.**

✔ **Episodic vertigo not associated** with any trigger may be a symptom of **vestibular neuritis.**


Patient presents with dizziness or vertigo
Is the timing episodic or continuous?
Episodic
Continuous
Is it triggered or spontaneous?
Is it associated with trauma or toxins, or spontaneous?
Triggered*
Spontaneous
Trauma or toxin
Spontaneous
Dix-Hallpike maneuver
Hearing loss
Migraine headache
Psychiatric symptoms
Barotrauma
Medications
HINTS examination
Positive
Negative
Meniere disease
Vestibular migraine
Panic attack, psychiatric condition
Saccade present, unidirectional horizontal nystagmus, normal test of skew
No saccade, nystagmus dominantly vertical, torsional or gaze-evoked bidirectional, abnormal test of skew
Benign paroxysmal positional vertigo
Assess for orthostatic hypotension
Peripheral etiology
Central etiology†
Vestibular neuritis
Stroke or transient ischemic attack