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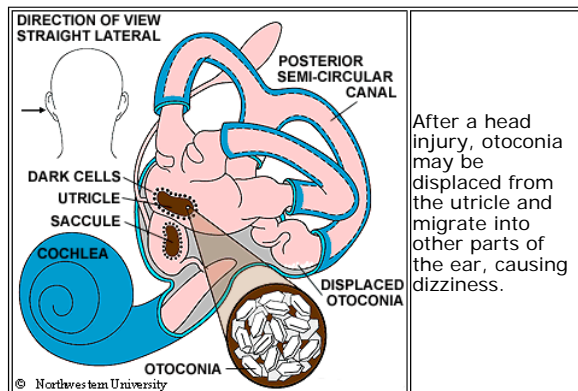
POST-TRAUMATIC VERTIGO

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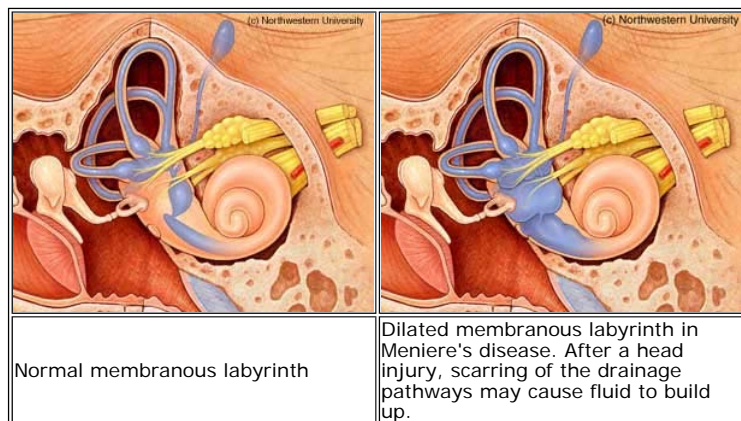
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Head injuries are sustained by 5% of the population annually. Post-traumatic vertigo refers to dizziness that follows a neck or head injury -- while injuries to other parts of the body might in theory be associated with dizziness, in practice this is almost never the case. Patients with head or neck injury may also have loud and disturbing [tinnitus](#) (Folmer and Griest, 2003). The literature suggests that recovery occurs in from 3-9 months in most individuals, but that symptoms persist for more than 1 year in 10 to 15%.

Because of the high incidence of litigation associated with post-traumatic vertigo, most clinicians are extremely cautious in making this diagnosis. There are many potential causes of post-traumatic vertigo. A recent study performed in an otolaryngology setting suggested the following distribution of "primary" disorders: labyrinthine concussion (18), [rupture of the round window membrane -- fistula](#) (6), and [cervicogenic vertigo](#) (12). The secondary disorders included otolith disorders (5), [delayed endolymphatic hydrops](#) (12), and canalolithiasis (9) ([BPPV](#)). (Ernst et al, 2005). Another recent study (Hoffer et al, 2004) grouped patients into "positional vertigo", migraine-associated dizziness, and "Spatial Disorientation" (a wastebasket category). It seems likely that the distribution differs according to the practice setting (e.g. neurology, otolaryngology, general medicine).



1. **Positional Vertigo**, and particularly [Benign Paroxysmal Positional Vertigo or BPPV](#), is the most common type of severe dizziness, and it is also common after head injury, occurring in about 28% of persons with post-traumatic vertigo (Hoffer et al, 2004). It is easily recognized by the pattern of dizziness that is brought on only when the head is placed in certain positions. There are several good treatments for BPPV and the prognosis for this syndrome, in the proper hands, is excellent. It is also possible to have rarer causes of positional vertigo including mainly [utricular injury](#), vestibular atelectasis, and various forms of central vertigo caused by cerebellar or brainstem disturbances.



2. **Post-traumatic Meniere's syndrome** --Also sometimes called "hydrops". Episodes of dizziness accompanied by noises in the ear, fullness, or hearing changes. Mechanism thought to be bleeding into inner ear, followed by disturbance of fluid transport. Onset of symptoms may vary from immediate to as long as one year later. There are frequently legal implications to this diagnosis. The probability of Menieres being reasonably attributed to post-traumatic mechanisms is a function of the severity of injury (severe makes more likely),

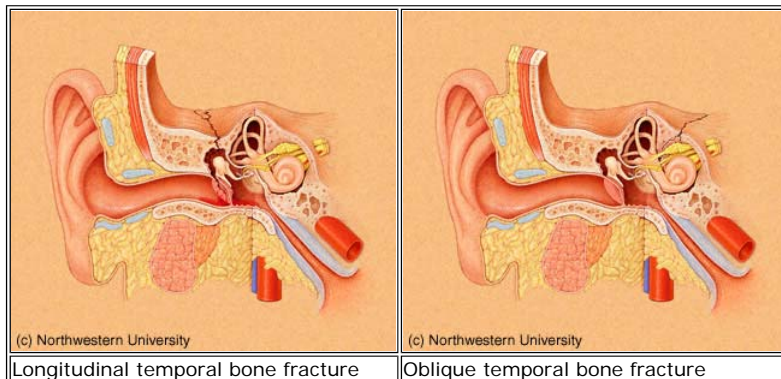
the latency from the injury (longer is less likely), the presence of a pre-existing condition, and the presence of secondary gain. Persons with the Large Vestibular Aqueduct syndrome are felt to be more likely to develop these symptoms (Berettini et al, 2000).

3. **Labyrinthine "concussion"**. Defined as a non-persistent hearing or labyrinthine disturbance which follows a head injury, not caused by another mechanism. A hearing loss or a nystagmus must be present to make this diagnosis with a reasonable degree of medical certainty. While the name implicates an inner ear disturbance, this symptom complex may be impossible to differentiate from other entities. For example, it might be difficult to differentiate a labyrinthine "concussion" from an eighth nerve stretch injury, although newer testing modalities may help (e.g. [VEMP](#)).

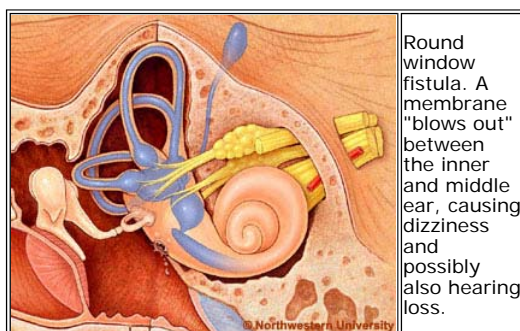


4. **Post-traumatic migraine**. Dizziness combined with migraine headaches. Migraine has been reported as common as 41% in persons with posttraumatic vertigo (Hoffer et al, 2004) Headaches and vertigo are common after head injuries. The main difficulty in this situation is to determine whether they are related or coincidental. It may also be difficult to distinguish post-traumatic headaches (which are very common), from migraine. The lack of a "litmus test" for Migraine, other than perhaps response to triptan medication, makes this diagnosis tenuous.

5. **Cervical Vertigo**. Imbalance following a severe neck injury. While nearly all dizziness specialists agree that cervical vertigo does exist, there is controversy regarding the frequency with which it occurs (Brandt T, 1996). Several theories exist as to the mechanism, the main ones being: 1). Vascular compression 2). Alteration of sensory input to the vestibular system. See later section on Whiplash.



6. **Temporal bone fracture**. Severe dizziness after the injury, with skull or temporal bone CT scan indicating a fracture. Often accompanied by hearing loss or peripheral facial weakness (Bell's Palsy). Temporal bone fractures, especially the oblique variety (see above), may impair hearing and cause dizziness. There often is blood seen behind the ear-drum (hemotympanum). Either a conductive or sensorineural hearing loss may be present. Vestibular deficits are also common, especially in the oblique variety. Bilateral vestibular problems are exceedingly rare. Treatment is conservative. Prophylactic antibiotics are given, usually for 4 weeks. Myringotomy and insertion of a ventilating tube may be indicated, especially for serious otitis that persists after one month (Pulek and Deguine, 2001).



7. **Perilymph fistula**. Usually symptoms of imbalance and dizziness provoked by straining or blowing the nose. People with fistula may also get dizzy with loud noises (called Tullio's phenomenon). The frequency to which this syndrome occurs is controversial, but general opinion holds that it is rare.

7. **Psychogenic vertigo**. There are many possibilities. Factitious vertigo is complaints of vertigo related to psychological causes such as depression, anxiety, or an attempt to obtain compensation (also known as "malingering"). Anxiety and depression may result from traumatic brain injury that creates a self-perpetuating psychological reaction (Alexander, 1998). Post-traumatic stress disorder (PTSD) can result in reexperiencing and hyperarousal symptoms (King et al, 1998; Stein, 2002).

8. Epileptic vertigo. Vertigo due to brain injury, typically the part of the temporal lobe that processes vestibular signals. Loss of consciousness usually occurs at the time of injury and vertigo is generally accompanied by altered consciousness (Tusa et al, 1990). The typical symptom is "quick spins", although this symptom has other potential causes (BPPV, vestibular neuritis). Treatment is with anticonvulsants. Topiramate is a particularly good medication for this condition as it is also useful in [Migraine](#).

9. Diffuse axonal injury (DAI). Pure deceleration forces can produce diffuse axonal injury (Gennarelli et al, 1982). In some individuals who come to autopsy after a twisting type injury of the head on neck, small areas of bleeding (petechial hemorrhage), and interruption of neuronal circuits (axonal damage) can be found. Complaints of dizziness attributed to brainstem injuries which cannot be imaged with a good MRI. This is an autopsy diagnosis -- it cannot be made with certainty prior to death. Historically, significant DAI is not felt to occur in awake humans who do not report loss of consciousness. A thirty minute loss seems likely to be needed for a significant DAI (Alexander, 1998).

10. Postconcussion syndrome. This is basically a combination of headache, dizziness, and mental disturbance which follows a head injury, without an identifiable etiology. It is a "wastebasket" syndrome, meaning that the diagnosis is made mainly by excluding other diagnoses. If an etiology can be determined for symptoms, a more specific diagnosis should be used. Post concussion syndrome is often attributed to "Traumatic Brain Injury", or TBI, which is simply a general term for a head injury affecting the brain. While dizziness and nausea symptoms usually resolve over 6 weeks, cognitive symptoms and headaches may be persist longer. Hoffer et al (2004) suggested that symptoms persisted an average of 39 weeks -- about 9 months, and that return to work usually occurred at about 16 weeks. Occasionally symptoms are permanent. As noted above, in many cases, chronic symptoms are psychological in origin. Balance symptoms after concussion generally resolve by 10 days (Peterson et al, 2003)

11. Whiplash injury syndrome. The term "whiplash" is generally used to describe neck injuries that follow a rear-end collisions. Vertigo in this situation is usually attributed to "[Cervical vertigo](#)", but there are other potential causes (see below). Whiplash is classically attributed to soft tissue injury caused by hyperextension of the neck (Carroll et al, 1985). Injuries may include rupture of the anterior longitudinal ligament, muscle hemorrhage and tear, disk rupture, and occasionally, brain injury. Visual disturbances as well as inner ear disturbances are classically attributed to vertebral artery injury (Carroll et al, 1985). The vertebral arteries might be injured by movement of the vertebrae, or elongation of the vertebral arteries (Panjabi et al, 1998; Eck et al, 2001). In the latter situation, one would not expect to find any abnormalities of vertebral motion on imaging.

Whiplash clinically is similar to postconcussion syndrome, but with the addition of neck complaints. It is possibly related to [cervical vertigo](#). Dizziness occurs in 20-60%. It can persist for years but fortunately about 75% of patients are recovered by 1 year (Radanov et al, 1994). Long term studies show that aches and pains may persist in 20 to 45% of patients with significant whiplash. Degenerative problems develop after injury in about 40% of patients. They are more common in persons with more severe collisions.

Vibert and associates (2003) reported three cases of peripheral ear type vertigo (1 BPPV, 2 vestibular nerve injury) after whiplash. They suggested that dizziness associated with whiplash may be more often due to vestibular injury rather than neck or brain trauma.

Whiplash may be increased by use of seat-belts. Seat-belts limit body injury, but can paradoxically increase cervical injuries as they restrict movement of the trunk. Testing for this condition may include X-rays of the neck. Active flexion and extension lateral views can be helpful in documenting dynamic stability. A CT scan of the cervical spine may help in better defining bony injuries. An MRI and MRA scan of the neck may be helpful with disks, vascular syndromes, and other soft tissue injuries.

Diagnosis of post-traumatic vertigo

First the doctor will want to know exactly when and how the head or neck was injured, and the character of the dizziness (i.e. spinning ? unsteadiness ? confusion ?). He/she will want to know if you were unconscious and the duration of time. Did the airbag deploy ? There is a significant incidence of vertigo and hearing disturbance after airbag deployment (Yaremchuck and Dobie RA. 2000). All available records from the emergency room or hospital where you were seen after the injury should be obtained and shown to your doctor. This is especially important when there is litigation as much may depend on small details.

Next, a specialized examination for dizziness will be performed. Balance will be measured, often with [moving platform posturography](#). A search for "[nystagmus](#)" will be made, related to head and/or neck position or to vibration of the neck. You may be checked for pressure sensitivity with [the fistula test](#).

Laboratory tests will be ordered. In most instances these will include an audiogram, [ENG](#), possibly an MRI scan or CT scan of the inner ear (temporal bone CT scan). If available, a [VEMP](#) may be useful. An EEG may be obtained for persons with paroxysmal cognitive symptoms suggestive of epilepsy. In patients with hearing disturbance, an "[ECOG](#)" may be done. [Moving platform posturography](#) is helpful to quantify balance deficits.

[Psychological testing](#) is sometimes done in persons who have entirely normal test results. They can document interactions between symptoms and personality as well as cognitive difficulties. Such testing is often useful in sorting out the situation when patients are in litigation and could benefit from an appearance of ill health.

Treatment of post-traumatic vertigo

Treatment is individualized to the diagnosis. Treatment usually includes a combination of [medication](#), changes in life style, and possibly [physical therapy](#). Occasionally, surgery may be recommended.

References:

- Alexander MP. In the pursuit of proof of brain damage after whiplash injury. Neurology 1998;51:336-340
- Berrettini, S., E. Neri, et al. (2001). "LARGE VESTIBULAR AQUEDUCT IN DISTAL RENAL TUBULAR ACIDOSIS High- resolution MR in three cases." Acta Radiol 42(3): 320-322.
- Brandt. Cervical Vertigo -- Reality or fiction ? Audiol Neurootol 1996;1:187-196
- Carroll C, McAfee P, Riley P. Objective findings for diagnosis of whiplash. J. Musculoskel med 3(3) 57-76, 1986
- Eck JC et al. Whiplash: a review of a commonly misunderstood injury. Am J. Med 2001;110: 651-6
- Ernst A, Basta D, Seidl RO, Todt I, Scherer H, Clarke A., Management of posttraumatic vertigo. Otolaryngol Head Neck Surg. 2005 Apr;132(4):554-8
- Feneley, M. R. and P. Murthy (1994). "Acute bilateral vestibulo-cochlear dysfunction following occipital fracture." J Laryngol Otol 108 (1): 54-6.

- Folmer RL, Griest SE. Chronic tinnitus resulting from head or neck injuries. Laryngoscope 2003 May; 113(5):821-7
- Genarelli and others. Diffuse axonal injury and traumatic coma in the primate. Ann Neurol 1982; 12:564-574.
- Hoffer ME and others. Characterizing and treating dizziness after mild head trauma. Otol Neurotol 25: 135-138, 2004
- King and others. Confirmatory factor analysis of the clinician-administered PTSD scale. Psychol Asses 1998; 10: 90-96
- Panjabi MM, and others. Mechanism of whiplash injury. Clin Biomech 1998; 13:239-49
- Peterson CL and others. Evaluation of neuropsychological domain scores and postural stability following cerebral concussion in sports. Clin J. Sports Med 13:250-257, 2003
- Pulec JL, DeGuine C. Hemotympanum from trauma. ENT journal, 2001, Vol80, 486
- Radanov BP, Surzenegger M, Schnidrig A. Relation between ... Br. J. Rheum 1994; 33:442-448
- Rubin AM. Dizziness associated with head-and-neck trauma. AudioDigest Vol 30, #22, 1997
- Stein MB. A 46 year-old man with anxiety and nightmares after a motor vehicle collision. JAMA 288:12:1513-1522, 2002
- Tusa RJ, Kaplan PW, Hain TC, Naidu S: [Ipsiversive eye deviation and epileptic nystagmus](#). Neurology. 1990.
- VIBERT D, Hausler R. Acute peripheral vestibular deficits after whiplash injuries. Ann Otol Rhinol Laryngol 2003; 112: 246-51
- YAREMCHUK K, Dobie RA. [Otologic injuries from airbag deployment](#). Otolaryngol Head Neck Surg 2001; 125: 130-4.

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