

Nystagmus

Nystagmus describes the rapid involuntary motion of the eyes. The eyes can move in many directions, depending on the type of nystagmus, and have a multitude of possible factors, some of which are underlying diseases and conditions. These causes can range from benign to serious conditions such as strokes.



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Pathophysiology

Vestibulo-Ocular Reflex (VOR) Dysfunction

Vest-bull-eye with Reflex-hammer

The Vestibulo-ocular Reflex (VOR) is the reflexive counter-movement between the eyes and the head. During the normal function of the VOR, the eyes move in the opposite direction of the head, allowing for smooth tracking and visual acuity even during movement such as walking and running. A dysfunctional VOR may produce nystagmus and affect visual acuity during movement, which can lead to nausea and dizziness in some patients.

Vestibular Injury

Vest-bull Injury

The vestibular system plays an integral role in balance, and pathologies that afflict the vestibular system can result in nystagmus. Most disorders of the vestibular system are divided into central and peripheral pathologies, each having distinct effects on nystagmus. Central vestibular disorders often produce vertical or torsional nystagmus unaffected by fixation. Peripheral disorders produce nystagmus that may be alleviated by fixation and is often horizontally directed toward the affected side with a lesion.

Signs & Symptoms

Concussion

Head-percussion

Concussions are typically a result of acute trauma such as TBIs via forceful blows to the head, neck, or general body, causing sudden acceleration or deceleration of the head. Concussive symptoms include headache, walking difficulty, impaired balance, reduced cognitive function, and behavior changes such as increased aggression.

Upbeating or Horizontal Beating Eyes

Upbeating and Horizontal Beating Eyes

Nystagmus is typified by spontaneous movement of the eyes, sometimes referred to as "beating." The name the nystagmus is often given is based on the movement's direction. Jerk nystagmus refers to slow jerking of the eyes in one direction and fast jerking in the opposite direction. Pendular nystagmus describes eye jerks that occur at a similar speed in both directions. And rotary nystagmus features rotating or circular twitches of the eyes. These involuntary movements can negatively impact vision, balance, and coordination, especially during gait or any functional activity requiring movement.

Oscillopsia

Oscillating-fan Eyes

Oscillopsia is the primary symptom experienced by individuals with nystagmus and is described as the most debilitating symptom of nystagmus. Individuals with oscillopsia feel as if the "world is spinning," making their visual field extremely unstable. Oscillopsia is sometimes referred to as "bouncing vision."

Diagnosis

HINTS (Head Impulse-Nystagmus-Test of Skew)

Hints

The HINTS (Head Impulse-Nystagmus-Test of Skew) aids in the differential diagnosis of central vestibular causes of nystagmus, such as stroke, versus peripheral vestibular causes, such as that seen with acute ear infections. The HINTS test is normally conducted at the bedside by a trained neurologist and has 100% specificity and 96% sensitivity for ruling in or out stroke-related nystagmus.

History Examination

History Book

A thorough history examination is useful in identifying the root cause of nystagmus. Correctly distinguishing underlying conditions causing nystagmus that are life-threatening (such as strokes) and those that may respond to interventions (BPPV) is vital for the prognosis of patients with the condition. Key identifiers include the onset of the nystagmus as well as the occasion and behaviors that trigger symptoms.

INFARCT (Impulse Normal Fast-phase Alternating Refixation on Cover Test)

In-fart

The acronym INFARCT (Impulse Normal, Fast-phase Alternating, Refixation on Cover Test) refers to the three signs most closely linked to brainstem lesions, often ischemic strokes, causing nystagmus. The signs, skew deviation (the amount of misalignment between the oculomotor system and vestibular system), a normal result on a HINTS exam, and nystagmus that changes direction with head movement are all highly correlated with strokes within the brainstem. Physicians who notice these three signs should strongly consider referring this patient to a more specialized medical professional for attention and treatment.

Visual Acuity Test

Eye Accuracy Test

A Dynamic Visual Acuity Test utilizes the Snellen Eye Chart or similar functioning tool in order to gauge a patient's level of visual accuracy at a distance. During this exam, the physician will first have the patient read the letters from a distance while completely stationary. Next, the physician will stand behind the patient and, while holding the patient's head, move it side to side at a speed of 2Hz while asking them to re-read the chart starting from the bottom towards the top. The physician should then record how many lines were accurately read in each phase. Children who lose more than one line of acuity and adults who lose more than two are likely to have an underlying vestibular disorder that may be causing their nystagmus.

Treatment

Brandt-Daroff Maneuver

Bandit-Dwarf

The Brandt-Daroff Maneuver is a set of habituation exercises intended to help reduce Nystagmus and associated visual disturbances in those with Benign Paroxysmal Positional Vertigo (BPPV). The maneuver will elicit symptoms of dizziness, at which point the patients are allowed time to adjust until the dizziness subsides. Research into how and why the maneuver aids in the reduction of Nystagmus ranges from theories that it relocates the octonia ("ear stones") within the inner ear, allowing them to function normally, to theories that it enables patients to adapt to the feelings of dizziness, therein lowering the intensity. Regardless, the maneuver has a success rate above 90% for most patients with BPPV-related Nystagmus.

Epley Maneuver

EP

The Epley Maneuver, similar to the Brand-Daroff Maneuver, is a set of habituation exercises that can be performed with or without a healthcare professional and is aimed at reducing the symptoms of nystagmus caused by Benign Paroxysmal Positional Vertigo (BPPV). The Epley Maneuver aids in moving the octonia, also known as canaliths ("ear stones"), out of the canals of the inner ear to prevent them from sending "false signals" of the head's position to the brain and reduces symptoms of BPPV-related nystagmus. The Epley Maneuver is considered less time-consuming than the Brandt-Daroff Maneuver, however, both are effective in reducing symptoms of BPPV-related nystagmus.

Baclofen

Bachelor-finch

Baclofen is a muscle relaxant that can be useful in treating symptoms of acquired (non-congenital) nystagmus. The mechanism of action of Baclofen allows it to reduce the movement of the oculomotor muscles, indirectly lowering nystagmus-related symptoms. Physicians should be mindful of adverse side effects such as increased lethargy, drowsiness, muscle weakness, and withdrawal side effects such as seizures.

Considerations

Congenital vs Acquired

Present-from-birth vs Acquired-magnet

Nystagmus can have a variety of etiologies, each one with its own unique prognosis and required approach for maximal outcomes. Congenital nystagmus is often seen as early as the 3rd month of life and normally features horizontal eye movements. Causes of congenital nystagmus include congenital cataracts, underdevelopment of the optic nerves, and albinism. For children age 6 months to 3 years, their nystagmus symptoms will normally resolve without intervention between ages 2 and 8. Acquired nystagmus can result from peripheral vestibular pathologies such as Meneire's Disease or central vestibular pathologies such as vertebrobasilar strokes, with treatments ranging from habituation in some peripheral vestibular pathologies to surgical intervention in central vestibular pathologies.