Videonystagmography

Videonystagmography (vi– dē– ō– nis– tag– mäg– rə– fē) or VNG, is a method of recording eye movement in response to vestibular (balance control mechanisms of the inner ear and central nervous system) stimulation. Historically, electronystagmography (ē– lek– trō– nis– tag– mäg– rə– fē) was used as the primary balance testing until the technology improved and VNG became more widely used in recent years.

VNG is accomplished by having the patient wear goggles with cameras inside to record eye movement while the patient is asked to perform specific tasks related to control of balance. The test is painless and takes approximately one hour to complete. The primary purpose of the test is to attempt to determine the source of vertigo or dizziness in order to direct further testing and treatment. It may be used to confirm a suspected diagnosis or to rule out various diagnoses. Less commonly, VNG may provide a diagnosis without need for additional follow-up.

VNG consists of several subtests. The visual portion of the test analyzes central nervous system control of eye movement and gaze fixation. The patient is asked to watch lights that jump around randomly or run smoothly back and forth while keeping the head centered and stationary. The patient will also be asked to stare at lights in various fixed positions.

The second set of subtests looks at the effect of head position change on eye movement. Eye movement and vestibular function are related. Visual fixation has the effect of suppressing vestibular reactions to position change. A cover is placed on the goggles to remove visual fixation, however, the eyes must remain open as the cameras are still recording eye movement. The appearance of positional nystagmus (a rapid back and forth eye movement) is an abnormal finding with different characteristics providing information about which parts of the vestibular system may be involved. One specialized rapid position change test from sitting to lying down is called the Dix-Hallpike maneuver and assists with the identification of benign paroxysmal positional vertigo (BPPV, *see additional flyer for more information*).

The last section of the test involves stimulating the inner ear balance system by changing the temperature of the inner ear using cool and warm streams of air directed into the ear canal. Each ear is tested separately with each temperature; therefore, there are four air irrigations. The temperature of the air causes the inner ear fluid to contract or expand, creating a difference between the ears. This difference "tricks" the ears into signaling the brain that the patient is moving in some manner. Nystagmus is a normal response to this test. The direction and strength of nystagmus is measured and the ears compared for symmetry. The eyes must remain open for recording, so the cover is placed on the goggles prior to each irrigation. At some point the cover will be removed to allow the eyes to fixate which is also part of the normal function of the vestibular system. Various symptoms are experienced but are not particularly meaningful for diagnostic purposes.

Due to the ability of VNG to test different areas of the balance system and being the only test that can isolate vestibular function of each ear, it is a standard part of the differential diagnosis protocol for vertigo and balance complaints.

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