
HOW DO I MANAGE

The Head Thrust Test: Technique, Usefulness, and Limitations

Daniel M Kaplan, MD., Youval Slovik, MD.

From the Department of
Otolaryngology-Head and Neck
Surgery, Soroka University Medical
Center, (D. Kaplan)
The Ben-Gurion University of the
Negev (Y. Slovik), Beer Sheva, Israel

Correspondence

Daniel M Kaplan
Department of Otolaryngology –
Head and Neck Surgery
Soroka University Medical Center
Beer Sheva, Israel

Phone: +972 54 749 9234
Fax: +972 8 646 6602
E-mail: dankap@bgumail.bgu.ac.il

Submitted: 29 May, 2005
Revised: 20 July, 2005
Accepted: 22 July, 2005

Mediterr J Otol 2005; 1:144-147

Copyright 2005 © The Mediterranean
Society of Otolology and Audiology

The head thrust test, an examination for chronic peripheral vestibular loss, can be performed at the bedside or in the office setting. First described by Halmagyi and Curthoys in 1988, the head thrust test is performed by turning the patient's head to either side in the angular-horizontal plane to reveal the high-frequency properties of the peripheral vestibular system. This test correlates well with significant excitability reduction indicated via the electronystagmography caloric test. In this article, we illustrate the pathophysiologic basis of the head thrust test and demonstrate its usefulness and limitations in diagnosing the cause of dizziness.

Complaints of dizziness, vertigo, and unsteadiness are common in the general public and among patients referred to an otolaryngologic specialist. After the patient's thorough medical history has been obtained, a neurotologic examination may be very useful in diagnosing the type of peripheral vestibular loss: central or peripheral, acute or chronic, and unilateral or bilateral. The head thrust test (HTT), which is also referred to as the "head impulse test" or the "Halmagyi test," is a very useful examination that can be performed in the office setting or at the bedside to diagnose a chronic peripheral vestibular disorder, as well as to identify the side of the hypofunctioning labyrinth. The goal of this article is to familiarize the practitioner with the HTT and its usefulness and limitations.

Performing the HTT

The HTT, which is based on the the doll's eye phenomenon, is used to evaluate the vestibular-ocular reflex (VOR) in the horizontal plane (see figures 1-5) To demonstrate the VOR, the patient moves his or her head from side to side while focusing on a midline target. This causes the eyes to move in a velocity like that of the head movement but in the opposite direction. When the HTT is performed, the patient is seated in front of the examiner. The patient's head is rotated approximately 20° from the midline position while his or her gaze remains fixed on the examiner's nose. The patient's head is then turned swiftly to the midline while the examiner carefully evaluates the position of the patient's pupils. The eyes of a healthy patient move accurately in the direction opposite to the head movement and seem to remain fixed (Figures 1 and 2).

The patient's head is then turned several times from the right and from the left side, alternately, to mid position. When the head is turned towards the ear with peripheral vestibular loss, the eyes initially move in concert with the head movement (figures 3 and 4); this is followed by a compensatory catch-up saccade, and the eyes once again become fixed on the target (Figure 5). This catch-up saccade, which is directed in the direction opposite to that of the head movement, is readily seen by the trained examiner and is considered

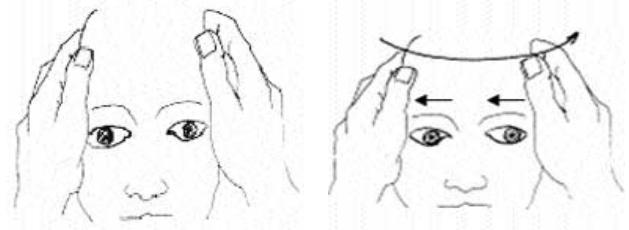


Figure 1

Figure 2

Figures 1 and 2: Results of testing for the vestibular ocular reflex (doll's eyes phenomenon) in a healthy patient. In Figure 1, the head of the patient is held while he visually focuses on the examiner's nose. In Figure 2, the eye position is shown after the patient's head was swiftly rotated to the left. The eyes shift contralaterally to the right with the same velocity as that of the head movement and remain in focus. This HTT result is in the normal range.

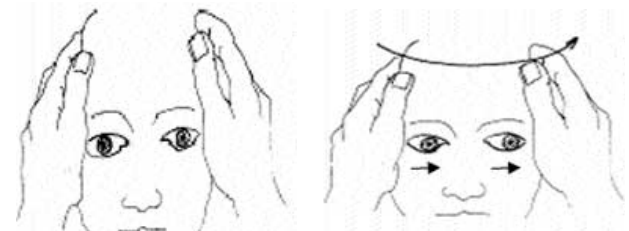


Figure 3

Figure 4



Figure 5

Figures 3-5. A positive head thrust test result in a patient with left peripheral vestibular loss. In Figure 3, the patient's head is in the primary position and his focus is fixed on the examiners nose. In Figure 4, the patient's head is swiftly turned to the left by the examiner. As a consequence of abnormal left peripheral vestibular loss, the vestibular ocular reflex is not elicited, and the eyes move in the direction of the head movement (straight arrows). In Figure 5, a saccade appears to the right (bold arrows) as the patient attempts to refocus. This corrective saccade in the direction contralateral to the head movement is considered a positive head thrust test result.

evidence of an abnormal (ie, positive) HTT result. Quite often, such patients complain of dizziness or blur-

red vision when their head is moved towards on the side of the hypofunctioning labyrinth.

The major advantage of rotating the patient's head approximately 20° from the midline position is the avoidance of stressing the neck muscles and cervical vertebrae, especially in a patient with cervical discopathy. The limitation of this technique, however, is that such movements are not randomized, because the primary position of the head suggests to the patient the direction of the head movement. Random movement may thus be more reliable.

Clinical relevance of the HTT

A typical situation in which the HTT would be useful is that of examining a patient several weeks after the diagnosis of vestibular neuritis to determine whether recovery or central compensation has occurred. The HTT might also be used to evaluate a patient afflicted with intermittent vertigo. A positive unilateral HTT result during vertigo remission would strongly suggest a peripheral vestibular loss and would identify the involved ear. A positive unilateral HTT in such patients, is usually accompanied by other signs, such as a shift in stepping test results, the presence of posttheadshake nystagmus, and the missing of steps in the tandem gait test performed by the patient whose eyes are closed. A bilateral positive HTT result, which signifies a bilateral peripheral vestibular loss, is usually associated with wide gait and a positive oscillopsia test result.

Halmagyi and Curthoys⁽¹⁾ first described the HTT in 1988 after studying 12 patients who underwent unilateral vestibular neurectomy and comparing them with 12 healthy volunteers. Patients who underwent a peripheral vestibular deafferentation demonstrated corrective "catch-up" saccades after a head turn toward the side of the lesion (but not to the contralateral side), and the controls exhibited no such saccadic movement. The sensitivity and specificity of the HTT were 100% in this specific population with maximal vestibular asymmetry. In 2 different studies of heterogeneous populations who exhibited varying degrees of canal paresis on the electro-nystagmography (ENG) caloric test,

sensitivity rates of 35% were observed^(2,3). This suggests that HHT results will often be negative, although the ENG caloric test documents canal paresis. Sensitivity increased to 84% in a subset of patients who demonstrated a 100% excitability difference in the results of the ENG caloric test⁽³⁾.

The catch-up saccade may be missed by the examiner; this may result in false-negative results when compared with the results of the ENG caloric test. Recordings of eye movements via magnetic scleral search coils have shown the presence of catch-up saccades that occur too quickly during the head movement for the examiner to notice (Unpublished data of Kaplan DM, Bance MB, Toronto General Hospital, Toronto 2001).

Although it indicates peripheral vestibular loss, the HTT is most often used as a high-frequency test of the peripheral vestibular organs. It provides important clinical information not documented by the ENG caloric test, which reflects the low-frequency range of the vestibular system. The concept of the high-frequency versus the low-frequency range of the peripheral vestibular system is comparatively new and has yet to be defined in the clinical setting. It has recently been established that a patient may not exhibit canal paresis on the ENG caloric test but may exhibit an abnormal HTT result, especially when eye movements were precisely recorded by magnetic scleral search coils⁽⁴⁾.

Authors' experience

The primary author (D. M. K.) of this article uses the HTT in a busy tertiary-care dizziness clinic when examining patients with vestibular symptoms. The HTT is very useful for identifying significant unilateral or bilateral peripheral vestibular loss during examination in the clinical setting or at the bedside. This examination must be performed by a clinician practiced in its administration, and test results may be equivocal. In our clinical experience, results of the HTT examination have always been positive in patients with complete loss of peripheral vestibular function but may be negative in those with a mild loss indicated by low excitability differences between sides on the

ENG caloric test. In patients with unilateral hearing loss, a positive HTT result strengthens the suspicion of an acoustic neuroma.

When examining a patient who is experiencing a bout of vertigo, the clinician should expect to identify nystagmus, a diagnosis that renders the HTT result either redundant or confusing. In addition, the patient with vertigo usually will not tolerate performing head movements during examination. In those with chronic peripheral loss, however, the HTT result unmasks central compensation that appears within the first few days after an acute vestibular insult such as vestibular neuronitis, labyrinthitis, or skull base fractures.

In summary, the HTT is a very important part of neuro-otologic examination and can be performed in the office setting or at the bedside. This test identifies unilateral peripheral vestibular loss as well as the involved side and may be useful in the diagnosis of bilateral peripheral loss. However, performing the

HTT (like most other components of a physical examination) requires a fair amount of practice.

REFERENCES

1. Halmagyi GM, Curthoys IS. A clinical sign of canal paresis. *Arch Neurol* 1988; 45: 737-739.
2. Harvey SA, Wood DJ, Feroah TR. Relationship of the head impulse test and head-shake nystagmus in reference to caloric testing. *Am J Otol* 1997;18:207-13.
3. Beynon GJ, Jani P, Baguley DM. A clinical evaluation of head impulse testing. *Clin Otolaryngol Allied Sci* 1998;23:117-22.
4. Prepageran N, Kisilevsky V, Tomlinson D, Rannalli P, Rutka J. Symptomatic high frequency/acceleration vestibular loss: consideration of a new clinical syndrome of vestibular dysfunction. *Acta Otolaryngol* 2005;125:48-54.