Original Article

PREVALENCE OF VESTIBULAR HYPERREACTIVITY IN PATIENTS WITH UNEXPLAINED DIZZINESS OR VERTIGO

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BACKGROUND—*Vestibular hyperreactivity (VH) is a disorder which is debated as a cause of vertigo and imbalance. We studied the prevalence of VH in patients with vertigo and the associated factors.*
MATERIALS AND METHOD—*A total number of 156 consecutive patients complaining of unexplained vertigo and imbalance, without any specific diagnosis, were referred to the audiologic clinic for caloric and rotational test (chair with decaying sinusoidal motion during the Summer and Fall of 1997. Data were compared with those of the 45 healthy patients.*
RESULTS—*VH was detected in 13 (8%) patients. Contrary to some early reports, no significant statistical relationship was found between this disorder and age, sex, thyroid, gynecology, CNS disorder, or motion sickness.*
CONCLUSION—*The prevalence of VH, the yet unknown disorder, in our country was 8%. Since no documented prevalence rate was found in the pertinent literature, and nor was there any mention of VH as one of the causes of vertigo in most evaluations, the prevalence rate obtained in our study seemed significant, although further studies are warranted. Exact criteria and characteristics of VH and whether it is a newly defined topic or a part of other disorders are not yet clear.*

Keywords***: vestibule; vertigo; hyperreactivity.***

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INTRODUCTION

Vertigo and imbalance are among the common complaints of patients, referring to otolaryngologists; this may be due to dysfunctioning of the following systems.

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1) Reception: vestibular system, visual system and proprioception. 2) Itegration: brainstem, cerebellum and others (vestibular nuclei, inferior olivary nucleus, olivary nucleus, dorsal nucleus of vagus, ocular motor nuclei, and anterior horn cells). Vestibular-ocular reflex (VOR), vestibular-spinal reflex (VSR), and inhibitory reflexes of cerebellum on vestibular nuclei are important parts in controlling balance. 3) Perception: thalamus and brain cortex.[1] Although the role of vestibular hyperreactivity (VH) in vertigo and imbalance has been discussed, but unlike vestibular hypoactivity, few studies have been presented in medical texts.[2]

Increased reaction and irritability of vestibular system which is anatomically and physiologically intact, may cause this disorder for having lower than normal threshold. CNS disorders like multiple sclerosis,[2] cerebellar atrophy,[3] allergic encephalitis,[4] atherosclerosis and also diabetes mellitus,[5] and motion sickness[6] have been reported to be associated with VH in earlier studies. We studied the prevalence of VH in patients with vertigo and its associated factors.

MATERIALS AND METHODS

We studied 156 patients who were referred to audiometric clinic, complaining of unexplained vertigo and imbalance, during the Summer and Fall of 1997. None of these cases, considering their history and physical examination, could be diagnosed as a defined and classic disease such as Mennier's disease, benign paroxysmal positional vertigo (BPPV), inner ear fistula, etc. No history of head trauma or specific like acrobat or ballet dancing was detected in their history. VH was differentiated from other etiologies by performing bilateral caloric test with cold water and rotatory test

and with sinusoidal pattern of rotation based on the following parameters: 1) maximum velocity of the slow phase of nystagmus with cold water caloric test > 27.5 degrees/sec (mean of both ears); 2) maximum velocity of the slow phase of nystagmus in rotatory test > 35 degrees/sec; and 3) minimum of provocative acceleration of nystagmus in rotatory test < l.62/sec (1.62 is the acceleration of the seventh lap of sinusoidal pattern of rotatory chair).

The aforementioned criteria were resulted from performing those tests on 45 normal cases without true vertigo or history of otologic disorders. The control cases were mostly referred by internists, due to some imbalance sensation. According to ENG results no central or peripheral vestibular system abnormality was detected in control cases. Their problems were probably due to other etiologies like neck muscles, psychologic problems and metabolic disorders like hyperlipidemia, or hypoglycemia. The control cases were 30 to 60 years old; the age range of the study group was similar.

Tests were performed with Nicolet electro-nystagmograph-Spirit Model 1992. These 45 normal persons were examined by bilateral caloric test, cold water, and rotatory test with sinusoidal pattern of rotation. Mean of maximum velocity of slow phase of nystagmus with bilateral caloric test with cold water was 21.65 ± 3.23 degrees/sec. Therefore, more than 27.5/sec was considered as abnormal. Maximum velocity of slow phase of nystagmus in each case was the mean of values of both ears. On performing rotatory test, and on normal people, the mean of maximum velocity of slow phase of nystagmus was 26.62 ± 3.33 (maximum = 35 degrees/sec, and minimum = 20 degrees/sec); more than 35 were considered as abnormal. Irritability threshold (minimum of provocative acceleration for vestibular response) was 1.62 degrees/sec.[2] Therefore deviations from the mentioned results were considered as the parameters of VH in patients complaining of dizziness or imbalance. Patient data like age, sex and history of thyroid, CNS, gynecologic, metabolic disorders (urea, TG, cholesterol, BS, uric acid), and motion sickness were gathered in the questionnaire.

RESULTS

The prevalence of VH was 8% (13/l56) in our study. There was no significant statistical relationship between sex (p value = 0.074) age (p value = 0.124), and VH occurrence. Other associated disorders in patients presenting with VH were thyroid disorder: 2 cases; gynecologic disorder: 1 case; CNS disorder: 1 case; and motion sickness: 2 cases.

DISCUSSION

Audiologic testing, posturography, and electro-nystagmography are the most cost-effective tests in evaluating patients with dizziness and vertigo.[7,8] Gordon[9] reviewed the results of the standard electro-nystagmography (ENG) and sinusoidal harmonic acceleration (SHA) tests of 52 patients referred for ambulatory vestibular laboratory tests, due to a nonspecific illusion of movement, but with a normal otoneurological examination. Abnormalities were found in the vestibular tests of 35 (67%) patients, 22 of whom (63%) were finally diagnosed as having a unilateral peripheral vestibular lesion, and 13 (37%), with benign positional vertigo. These results suggest that a high percentage of patients with nonspecific vertigo and a normal otoneurological examination, probably suffer from peripheral vestibular dysfunction, which can be objectively documented by the ENG and SHA tests.

There are some reports on VH and its relation to other disorders like whiplash injury, central lesion, and even spasmodic torticollis. Vestibular, oculomotor and respiratory tests were performed on 32 patients after whiplash injury caused by a rear-end car collision. Oculomotor functions were generally normal. The cervico-ocular reflex was usually absent or displayed the low gain typical of normal subjects. There was no nystagmic response to static neck torsion. The VOR showed VH in a significantly large number of cases (n = 17, or 53%).

The respiratory test results were also typical of the hyperventilation syndrome (HVS) in a significantly large number of cases (n = 12, or 3 8%). The findings of VH and the HVS were not significantly correlated within the patient group. However, the combination of VH and the HVS occurred significantly more often (n = 7, or 22%) than could be accounted for by combined false positivity. Most of the significant findings were due to high relative frequencies in the women: 11 out of the 17 (65%) women showed VH, 8 (47%) had the HVS and 5 (29%) showed a combination of VH and the HVS. The findings were not correlated with the patient's age or the time interval between the accident and the examination.

VH might have been the result of plastic adaptation to limited head mobility secondary to neck pain. Behavioral and emotional distress might offer alternative explanations for both VH and the HVS.[10] Yin from china,[11] found an abnormal sinusoidal harmonic acceleration test result in 204 patients (51%) among 400 dizzy patients. Phase lag decreases were the most common abnormal results. Both patients with Meniere's disease and with

central disorders revealed phase lag decreases. However, patients with central lesions showed decreases of phase lag with more frequency. Direction of asymmetry in patients with central lesion was in good correlation with the side of lesions. The five common types of abnormality were reported in Yin's paper. They were vestibular habituation and asymmetry, vestibular habituation, vestibular asymmetry in higher frequencies, vestibular deficit, and VH.[11]

VH prevalence was higher in patients with idiopathic spasmodic torticollis than in normal population. Ocular motor tests performed on 14 patients with idiopathic spasmodic torticollis, were normal. The VOR tested in eight patients showed a significant high level in seven. It is suggested that this phenomenon is secondary rather than the cause of spasmodic torticollis.[12]

It is assumed that the phenomenon of unilateral hyperreactivity in these cases can be explained by release from commissural inhibition on the basis of temporary vestibular decompensation. VH and hyperventilation syndrome are interrelated phenomena in many papers. In a group of 26 patients with a hyperventilation syndrome, 77% showed VH of velocity step responses, mostly due to an increase in gain of the VOR, apparent from an increase in initial velocity, but also due to an increase in the time constant. Similar effects were found among 11 normal subjects after forced hyperventilation.[13]

In our study no significant relationship was detected between VH occurrence and the mentioned disorders (thyroid, CNS, gynecologic and motion sickness). Although age was not statistically related to VH prevalence, all of our patients were older than 30. Since no documented prevalence rate has been reported before and neither has VH ever been mentioned as one of the causes of vertigo in ENG studies, prevalence rate of 8% obtained in our study seems significant and perhaps warrants further investigation.

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