

Abstract

Currently a relatively new clinical entity which is migraine associated dizziness (MAD) has become a very common disorder. The objective of this study is to describe the auditory vestibular findings in MAD; which could play a major role in facilitating diagnosis and creating better awareness of the condition. This study included 50 adults which were divided into 2 groups: the cases group consists of 40 adults, suffering from MAD and the control group which comprised 10 adult migraineurs. The entire study group was subjected to basic audiological and vestibular assessment. The results showed 77.5 % of bilateral within normal peripheral hearing, 22.5 % revealed SNHL. Regarding Vestibular assessment; all cases and controls were subjected to VEMP, VNG tests and SOT testing. The caloric test gave the highest percentage of abnormal results 47.5 %, followed by VEMP 30 %. Positioning test revealed abnormality in 12.5 %, positional test gave 5 % abnormality and only one case showed down beating post head shakes. There appears to be no typical pattern in vestibular testing for establishing a diagnosis of MAD, which reinforces even further the need for a carefully taken clinical history and audiometric assessment.

Key words:

Migraine, Vertigo, Dizziness, Anxiety, Audiometric findings, Vestibular testing.

The Audiovestibular findings of patients with Migraine Associated Dizziness

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نتائج تقييم السمع والإتزان في مرضي الصداع النصفي المصاحب بالدوار

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List of Abbreviation

Abbreviation	Full name
5-HT	5 hydroxy tryptamine (Serotonin)
ADT	Adaptation Test
BPPV	Benign paroxysmal positional vertigo
BTM	Basilar type migraine
CDP	Computerized Dynamic Posturography
CGRP	Calcitonin gene related peptide
CoQ10	Co-enzyme Q10
CSD	Cortical spreading depression
CT	Computed tomography
DC	Direct current
EcoG	Electrocochleography
EEG	Electroencephalogram
ENG	Electronystagmography
FHM	Familial hemiplegic migraine
ICHD-II	International classification of Headache disorders
IHS	International Headache Society
MAD	Migraine associated dizziness
MARD	Migraine to Anxiety Related Dizziness
MCT	Motor Control Test

List of Abbreviation

MD	Meniere disease
MRI	Magnetic resonance imaging
MS	Meniere syndrome
NKA	Neurokinin A
OKN	Optokinetic nystagmus
PAG	Periaqueductal grey
PLF	Perilymph fistula
SCM	Sternocleidomastoid
SHA	Sinusoidal Harmonic Acceleration
SMD	Space and Motion Discomfort
SNHL	Sensorineural hearing loss
SOT	Sensory organization test
SP	Substance P
TIA	Transient ischemic attacks
VEMP	Vestibular Evoked Myogenic Potential
VN	Vestibular neuritis
VNG	Videonystagmography
VOR	Vestibulo-ocular reflex
VRT	Vestibular rehabilitation therapy
VSR	Vestibulo-spinal reflex

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Introduction

The association between hearing, balance disorders and migraine has been recognized since ancient Greece. Aretaeus of Cappadocia (131 B.C.) described precisely and in detail the occurrence of both conditions during a migraine crisis. In 1861, Prosper Ménière published a similar review describing the symptoms of Ménière disease (MD) in migraine patients. Many authors defined the concept that vertigo, hearing loss and tinnitus were part of the symptoms that some migraine patients presented (**Replöeg and Goebel, 2002**).

Currently, otologists and neurologists have received patients presenting clinical picture of migraine-like headaches, episodes of dizziness, vertigo, aural fullness, auditory symptoms and tinnitus. These patients have led to a description of a new clinical entity, which has been given various names, including: migraine-associated dizziness (MAD), migraine-related dizziness, migraine-related vertigo, migrainous vertigo, migraine-anxiety related dizziness and migraine-associated cochleovestibular dysfunction (**Bahamad et al., 2009**).

Various manifestations of dizziness have been reported during headache crises in migraine patients, such as rotational vertigo, positioning vertigo, intolerance to head movement, and disequilibrium (**Shepard, 2006**).

It is generally held view that migraine is unilateral pulsatile headache associated with visual and auditory disorders, and usually associated with nausea and vomiting. This concept remains correct and is the best known according to the International Headache Society (IHS) (**IHDC-II, 2004**).

Patients with MAD may experience all of the symptoms of Meniere's disease (MD) including episodic vertigo, sensorineural hearing loss (SNHL), tinnitus, and/or aural fullness. Patients with MAD may also experience

fluctuating attacks of dizziness independent of migraine headache. Therefore, patients with MAD are often misdiagnosed as having MD (**Reploeg and Goebel, 2002**).

The pathophysiology of MAD symptoms has not been fully clarified, migraine attacks, may be triggered by excessive neocortical cellular excitability; however, the hyper excitability is believed to transition to cortical spreading depression. Some other forms of migraine are known to be due to channelopathies. Also, mutations in the some genes can cause migraine (**Rogawski, 2009**).

MAD clinical manifestations vary from one patient to the other. These manifestations are often mistaken with the classical symptoms of MD. It is therefore, an entity that lies between migraine with aura and MD; the differential diagnosis between these entities is often a major challenge requiring significant experience and knowledge about their clinical, diagnostic and therapeutic aspects (**Neuhauser and Lempert, 2004**).

Rationale

Epidemiological data have underlined the increasing importance of migraine related auditory vestibular dysfunction in recent years. The combined high prevalence of migraine and dizziness in this patient population makes MAD a condition that deserves attention. The description and associations found could play a major role in facilitating diagnosis and creating better awareness of the condition among clinicians and service providers.

Aim of the work

The purpose of this study is to describe the auditory vestibular findings in Migraine associated dizziness. The description and associations found could play a major role in facilitating diagnosis and creating better awareness of the condition among clinicians and service providers.

Epidemiology

Epidemiological data have underlined the increasing importance of migraine-related auditory-vestibular dysfunction in recent years with the highest morbidity worldwide; it affects about 4-6.5 % of men and 11.2-18.2% of women both in the USA and in Europe (**Furman and Marcus, 2003**).

Migraine affects individuals in their most economically productive age group, mainly 30-39 years (25.7%), 40-49 years (24.4%) and 18-29 years (22.3%), which underlies the importance of correctly diagnosing and treating this condition (**Lipton et al., 2002**).

This connection is even more evident in epidemiological studies of migraine patients: 28 to 36% of patients present associated dizziness and 25 to 26% present vertigo. Similarly, 36% of patients that complain of dizziness may fit into the clinical criteria for migraine, and 61% of patients with vertigo of unknown causes may also fit into the clinical criteria for migraine (**Lempert and Neuhauser, 2009**).

Furman et al., 2005 revealed that dizziness and vertigo occur in 54% of migraine patients and in only 30% of patients with headaches of other origins, such as tension-type headaches, reinforcing the hypothesis of co-morbidity between migraine and cochleovestibular disorders.

Migraine Related Terminology & Definitions

The concept that migraine is unilateral, pulsatile, headache associated with visual and auditory disorders, and usually associated with nausea and vomiting remains correct and is the best known aspect of migraine with aura, according to the International Headache Society (IHS) criteria that were described (**Neuhauser et al., 2006**).

Migraine:

A neurological syndrome characterized by altered bodily experiences, painful headache, and nausea that is more common in women than in men (**Neuhauser et al., 2006**).

Migraine with aura:

A recurrent disorder manifesting in attacks of reversible focal neurological symptoms that usually develop gradually over 5-20 minutes and last for less than 60 minutes. Headache with the features of migraine without aura usually follows the aura symptoms. Less commonly, headache lacks migrainous features or is completely absent (**Eggers, 2007**).

Basilar-type migraine (BTM)

Migraine with aura symptoms clearly originating from the brainstem and / or from both hemispheres simultaneously affected, but no motor weakness (**Lempert & Neuhauser, 2009**).

Vestibular migraine:

Any kind of migraine variant that manifests with predominantly vestibular symptoms (**Neuhauser et al., 2006**).