

## **7. Abstract**

**Purpose:** Vertigo is a common symptom that neurologist and otologist are confronted with. It is a standard situation in the emergency room that in patients complaining of isolated vertigo the origin of the symptom cannot be identified, despite a series of intensive neurological and otological examinations, including cranial CT. MRI is a more reliable tool than CT for the imaging of central vestibular structures. However, the routine use of MRI in these patients has been questioned because it is costly and time-consuming. The purpose of the present study is to (1) determine the diagnostic yield of MRI in patients with acute vertigo and uncertainty as to the central or peripheral origin after neurological, otological, and CT examinations, (2) identify the most common cause of central vertigo identified by MRI in this setting, and to (3) describe clinical characteristics of patients with vertigo of unknown cause (VUC).

**Design:** Retrospective, comparative, consecutive case series.

**Methods:** With the keyword "Schwindel" (the word for vertigo in German), we searched the discharge summaries of all inpatients admitted between January 1<sup>st</sup>, 2002 and June 30<sup>th</sup>, 2005 to the Department of Neurology, Charité Medical University Hospital, Campus Benjamin Franklin in Berlin. A total of 1205 patients were identified. After a hand-search, 108 patients were selected using the following criteria: (1) Chief complaint was acute vertigo, (2) no new obvious neurological symptoms or signs occurred such as limb weakness, facial paralysis, ophthalmoplegia, dysarthria, hemianopia, aphasia, or unconsciousness (unspecific or only subjective neurological symptoms such as remittent local paraesthesia did not lead to exclusion), (3) slight ear symptoms such as ringing or numbness could coexist, but none that could be diagnosed by the ear-nose-throat department as symptoms of a definite peripheral origin, (4) history, clinical symptoms and signs did not suggest vertigo origin, (5) head

CT on admission did not reveal origin of vertigo, and (6) cranial MRI examination during period of hospitalization.

After MRI examination, these patients were divided into group 1 (central vertigo) and group 2 (vertigo of unknown cause, VUC). The patients' medical record was reviewed in detail, and clinical and laboratory data were collected.

**Results:** After cranial MRI, 13 of 108 patients (12%) were found to have vertigo of central origin (group 1). By diffusion-weighted imaging, all identified lesions were ischemic. The lesion areas were pons, cerebellum, medulla oblongata, temporo-occipital lobe, parietal lobe, nucleus thalamus, splenium corpus callosum, both periventricular areas, and frontal lobe. The majority of these regions are supplied by the vertebrobasilar arterial system, which supplies vestibular system. Patients in group 1 and group 2 showed no significant difference in clinical characteristics such as age, sex, type or duration of vertigo, cerebrovascular risk factors, migraine or psychiatric complaints. No characteristic type, duration, or intensity of vertigo could be identified in group 1 or group 2. Nystagmus, nausea and vomiting, imbalance, and ataxia were reported in both groups with similar frequency, as well as abnormalities in the vertebrobasilar system in MR angiography. Non-significant trends toward a higher prevalence of elevated serum cholesterol, higher age, lower prevalence of psychopathological complaints, history of psychiatric disease or migraine history were observed in group 1.

**Conclusion:** In this study, the diagnostic yield of cranial MRI is low with a 12% detection rate for central causes of vertigo. Clinical and paraclinical characteristics are not useful for the decision to perform MRI testing. In vertigo patients with proven brain infarcts, lesions are not always found in the vestibular system. Despite a trend towards higher cerebrovascular risk factors, abnormalities in the vertebrobasilar system are only found infrequently.

Patients with VUC may have a higher rate of concomitant psychopathological symptoms or migraine.