BRIEF REPORT

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Dizziness as a first alarming symptom to neurological hospital admission: reasons and differentiation problem – a pilot study

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ABSTRACT

Aim. This prospective study aimed to assess the diversity of diagnoses in patients hospitalized in the neurology department, in whom the occurrence of dizziness was the presenting complaint during qualification for hospitalization, based on a joint assessment performed by a doctor and a physiotherapist and the implementation of treatment, including physiotherapy.

Material and Methods. The study included consecutive patients selected from 2155 individuals hospitalized between 2018 and 2020 in the Neurology Unit who reported dizziness as the presenting complaint.

Results. 100 patients (the mean age 58.68±16.57) were qualified for the study: 53 men (the mean age 59.47±15.44) and 47 women (the mean age 57.79±17.88). In the overwhelming number of cases, dizziness was associated with a vascular incident. However, cases of vertigo were also reported.

Conclusion. A variety of diagnoses were made in patients hospitalized in the neurological department in whom the occurrence of dizziness was the presenting complaint during qualification for hospitalization.

Introduction

One of the reasons why patients come to the Emergency Room (ED) is the first episode of dizziness [1, 2]. It is defined as an illusion of movement of the surroundings, one's own body, head, or the illusion of instability of the ground or uncertain posture. The illusion of rotational movement is characteristic of vertigo which is mainly associated with peripheral disorders, whereas the feeling of instability of the ground is attributed to central disorders [3]. Balance disorders and the fear of falling are not uncommon. It is estimated that this problem affects approximately 30% of patients over 65 years of age [4, 5]. The complaints reported by patients are subjective and heterogeneous, which makes it difficult to objectify them [6]. Although it is difficult to assess the severity of such symptoms based on medical history, they, undoubtedly, have a negative impact on patients' functioning in everyday life [7, 8]. However, an efficiently conducted diagnostic process, including general medical, ENT (Ear, Nose and Throat) and neurological examination, allows the detection of some symptoms suggesting the etiology of vertigo and/or dizziness [9, 10]. The diagnosis and treatment of vertigo of various origins are also of interest to physiotherapists.

Therefore, the main aim of this prospective study was the differentiation of dizziness and the assessment of its causes in patients hospitalized in the department of neurology.

This kind of research facilitates the expansion of knowledge about dizziness of various origins and, what is more, finding or choosing the best ways to recover functions lost after an incident.

Material and Methods

The study included 100 consecutive adult patients selected from 2155 individuals who reported dizziness and were hospitalized between 2018 and 2020 in the Department of Neurology, Faculty of Medical Sciences, Medical University of Warsaw. Patients with impaired consciousness and communication disorders were excluded. The age and sex of patients were not the criteria for inclusion in the study group during the first stage of the study (**Table 1**).

All the patients underwent the following diagnostic procedures: general neurological and neuroimaging examination. Particular attention was paid to the assessment of the cranial nerves, the presence of the cerebellar syndrome or disorders of proprioceptive sensation. The occurrence and type of nystagmus were assessed at the same time. For this purpose, Frenzel goggles were used in all patients.

The diagnostics were completed with an ENT consultation. The Dix-Hallpike maneuver was performed by a specialist to confirm benign paroxysmal positional vertigo (BPPV). A qualified physiotherapist assessed gait disturbances and posture. At the same time, static-dynamic tests were carried out, which enabled the planning of physiotherapy.

Patients included in the study also underwent procedures such as the Sensitized Romberg test and Sensory Integration Test (the assessment of the possibility of sensory processing of the provided stimuli – balance, sight, proprioceptive sensibility) performed by a physiotherapist. The patients underwent vestibular balance assessment under static conditions on a stable and unstable surface with and without vision. The Airex Balance Pad was used for this purpose, as it had been successfully adapted in research by Boonsinsukh et al. [16] in patients with a history of falls.

When assessing the patients while walking, the elements of the Dynamic Gait Index (DGI) were used to change the direction of gait and to draw attention to the stereotype of gait versus rehabilitation planning. DGI is used to assess both elderly patients at risk of falling, and patients

Table 1. Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
– Adult patients (regardless of gender) – Patients reporting dizziness as the presenting complaint – Patients without impaired consciousness and communication disorders	– Underage patients – Patients who do not report dizziness or report dizziness as one of the non-disturbing symptoms – Patients with impaired consciousness and communication disorders

after stroke, with Parkinson's disease, and labyrinth injury [17].

The treatment regimen depended on the cause of dizziness and the assessment of the functional status of patients according to the ICF (International Classification of Functioning, Disability and Health) classification. ICF is an international classification developed by the World Health Organization (WHO) mainly to standardize the ways of describing health and health-related conditions. It facilitates the classification of functioning and disability in relation to a health condition. As a clinical tool, it allows the assessment of health needs, selection of appropriate methods of physiotherapy and assessment of the effectiveness of such activities. ICF facilitates communication at the professional level of doctors and physiotherapists as well as healthcare professionals around the world as regards health and healthcare.

All the patients underwent pharmacotherapy and physical therapy according to the diagnosis.

The collected data were processed and analyzed using the SAS (Statistical Analysis System).

Results

Eventually, 100 patients aged 22 to 86 years were qualified for the study (4.6% of all hospitalized ones during the specified period): 53 men (the mean age 59.47 ± 15.44) and 47 women (the mean age 57.79 ± 17.88). The average age of all the

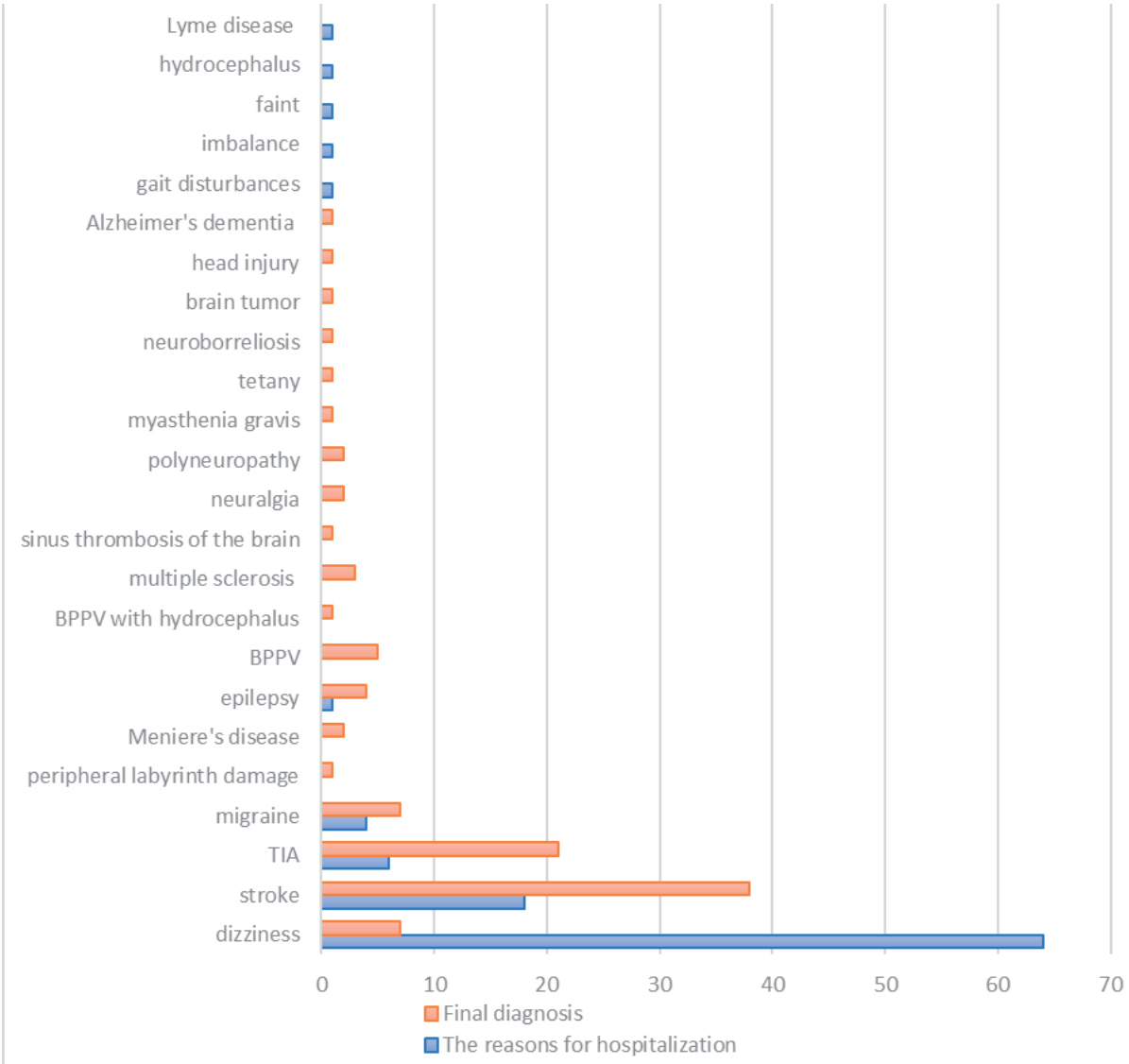

Figure 1. The reasons for the hospitalization of patients included in the study group and the final diagnoses

patients was 58.68 years (±16.57). The patients were divided into four age groups: up to 25 (4%), 26–50 (23%), 51–75, over 76 (14%) years old. The third age group (51–75 years) included 59% of the studied patients (27 women and 32 men).

The diagram presents the reasons for the hospitalization of patients included in the study group and the final diagnoses (**Figure 1**). All patients included in this study reported dizziness as the presenting complaint. The reasons for hospitalization were as follows: 61 patients with dizziness (61%) (without providing the initial diagnosis and/or the cause of the ailments described by the patients), 17 patients with stroke (17%), 4 patients with TIA (transient ischemic attack) (4%), 10 patients with headache (10%), 2 patients with gait disturbances (2%), 2 patients with weakness (2%), 1 patient with balance disturbances (1%), 1 patient with epilepsy (1%), 1 patient with Lyme disease (1%), 1 patient with hydrocephalus (1%). All the patients received the final diagnosis after an examination in the neurology department. 4 main diagnoses were made: stroke – 34 patients (34%), TIA – 25 patients (25%), migraine – 9 patients (9%), and dizziness (of unknown etiology) – 8 patients (8%). The majority of patients (59%) were aged 51–75, 23% aged 26–50, 14% aged over 76 and 4% aged under 25. This study revealed that dizziness was observed the most commonly – in 69% of patients. 74% of patients with dizziness were hospitalized because of a vascular incident in the brain (28/34 – 82% of stroke patients and 23/25 – 92% of patients with TIA). As regards the character of dizziness episodes in this group: the majority of patients after stroke (21/34 – 64% of stroke patients) experienced permanent dizziness, while in TIA patients the dizziness was of paroxysmal (11/25 – 44%) and permanent (9/25 – 36%) character. Several typical elements of examination were observed in patients with vascular incidents in the brain: a positive Romberg Test (neurological examination) and Sensitized Romberg Test (physiotherapeutic examination) – 71% (21/34 after stroke, 21/25 patients with TIA) and a positive result of Sensory Integration Test – 63% (22/34 after stroke and 18/25 with TIA). The illusion of rotational movement characteristic of vertigo was found in 23% of all patients. They were mostly diagnosed with BPPV (benign paroxysmal positional vertigo), BPPV with hydrocephalus and in case of two patients – Meniere's disease (2%). The Romberg Test, Sensitized Romberg Test and Sensory Integration Test were positive in 30% of patients with vertigo.

Discussion

Dizziness was the presenting complaint of almost every twentieth patient admitted to our neurological ward during the two-year observation period. The results confirm that vertigo is a common symptom that a neurologist has to deal with on a daily basis on duty. Moreover, in most cases, the assessment allowed for a proper diagnosis and the determination of the causes of those ailments.

The majority of studies concerning the epidemiology of different kinds of dizziness were conducted in EDs (emergency departments). However, ED diagnoses are mostly unconfirmed, which might bias the results [11], e.g. wrong diagnoses might be made in cases of cerebrovascular causes of dizziness. According to Kerber et al. [12] even 35% of such patients might be misdiagnosed. Differences between diagnoses are shown in **Figure 1** which confirms the importance of detailed assessment in neurology departments – for instance, only 17 cases out of 34 strokes (diagnosed in neurology units) were diagnosed in EDs or 4 TIA cases in EDs vs. 25 final diagnosed cases. Misdiagnosis may be very dangerous and have negative consequences for patients, e.g. the lack of adequate acute treatment.

Some patients find it difficult to describe the specific type of vertigo/dizziness, so it is often complicated to distinguish between these types in acute patient assessment, for example in ED.

A study by Kevin et al. [18] showed that patients with a diagnosis of stroke or TIA reported: dizziness in 23 cases, vertigo in 18 cases, imbalance in 11 cases, and more than one of those problems in 1 case (of all 53 cases). Our study revealed that almost 3/4 of patients with dizziness were hospitalized because of a vascular incident and they declared different characters of dizziness.

Some dizziness cases are specific for neurology specialists. However, according to Nowaczewska [13] they were still problematic in terms of diagnosis, which was also reflected in the results of this study as unknown-etiology cases of dizziness.

Sandlund et al. [14] pointed out that a better management algorithm could improve the quality of care for dizziness patients.

The authors found only one similar study published by Weisshaar et al. [19] in October 2019. A total of 11% of patients of a Norwegian hospital had dizziness as the primary symptom in a 1-year assessment period, in contrast to 4.6% found in our study. However, some groups were excluded from our study, e.g. people with communication problems.

According to the latest research during the SARS-Cov-2 pandemic the problem of dizziness evaluation should also be mentioned. A study by Mao et al. [15] demonstrated that dizziness was one of the most common neurological manifestations of COVID-19.

This research has several limitations – the study sample should be larger. However, it was a pilot study, so more data will be collected. Moreover, study design could be planned with interviewers blinded to case/control status, so as any information on the outcome cannot influence the collection of information – to reduce possible bias. Furthermore, the authors might consider a more detailed diagnosis, e.g. the exact location of the lesion in stroke patients – the authors focused on the cerebrovascular causes of dizziness in general in the pilot study.

Conclusion

1. Dizziness is a common symptom that requires consultation by a neurologist in the emergency room.
2. A variety of diagnoses were demonstrated in patients hospitalized in the neurological department in whom the occurrence of dizziness was the presenting complaint.
3. The role of a physiotherapist in the diagnostic process and treatment planning in patients with dizziness of various origins was indicated.

Clinical implications/ future directions

Future research is needed to be performed in a larger group to prepare the effective assessment procedure in dizziness cases including physiotherapy evaluation. It may provide a framework for dizziness management and give directions to the diagnoses of dizziness and treatment options to be used in neurology departments.

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Conflict of interest statement
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