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RESEARCH

## EVALUATION OF THE FINAL DIAGNOSIS OF ELDERLY PATIENTS ADMITTED TO THE EMERGENCY DEPARTMENT WITH A COMPLAINT OF VERTIGO

### ABSTRACT

**Introduction:** We aimed to evaluate the approach and final diagnosis of elderly patients admitted to the emergency department with a complaint of vertigo.

**Materials and Method:** The data extracted from the hospital database were analyzed for 5,473 patients, aged over 60 years, who presented at the emergency department between January 2012 and March 2014, with complaints of dizziness-vertigo. Of these, 2,963 (54%) were females and 2,510 (46%) were males, with a mean age of 71.4 years (range, 60–96 years). We evaluated the additional diagnoses, radiological examinations and treatments received by hospitalized patients.

**Results:** We identified three major findings. Majority of the patients with vertigo were discharged for outpatient treatment. Life-threatening central pathologies were detected in 4.1% of patients with vertigo and although majority of the emergency room visits for vertigo in the elderly population were caused by peripheral vestibular disorders, hypertension and cerebrovascular events were equally prevalent.

**Conclusion:** Among the elderly population, assessing all cases of acute vertigo as presentations of peripheral vestibular deficiency can lead to missed diagnosis, including dehydration and hypotension, which are readily treated as well as serious central pathologies that require further investigation.

**Key Words:** Emergency Department; Vertigo; Etiology; Patient Management; Geriatrics.

**Abbreviations:** ACS, Acute coronary syndrome; BPPV, Benign positional paroxysmal vertigo; CT, Computed tomography; CVE, Cerebrovascular event; MI, Myocardial infarction; MRI, Magnetic resonance imaging



ARAŞTIRMA

## BAŞ DÖNMESİ ŞİKAYETİ İLE ACİL SERVİSE BAŞVURAN YAŞLI HASTALARIN SON TANILARININ DEĞERLENDİRİLMESİ

### Öz

**Giriş:** Baş dönmesi şikayeti ile acil servise başvuran yaşlı hastalara yaklaşımı ve son tanılarının değerlendirilmesini amaçladık.

**Gereç ve Yöntem:** Elektronik kayıt sistemi kullanarak, acil servise Ocak 2012 ile Mart 2014 tarihleri arasında baş dönmesi şikayeti ile başvuran 60 yaş üzeri 5473 hastanın kayıtları tarandı ve değerlendirildi. Bu hastaların 2963'ü (%54) kadın ve 2510'u (%46) erkek idi ve hastaların ortalama yaşı 71.4 olarak saptandı (60-96 yaşları arasında). Hastaneye yatırılan hastaların ek tanıları, radyolojik muayene ve aldıkları tedavilerini değerlendirdik.

**Bulgular:** Üç önemli bulgu tespit edilmiştir. Baş dönmesi hastaların çoğu ayaktan tedavi ile taburcu edilmiştir. Yaşamı tehdit eden merkezi sinir sistemi ile ilgili patolojiler hastaların 4.1%'inde saptanmıştır. Yaşlı popülasyonda acil servise baş dönmesi nedeniyle yapılan başvuruların çoğunluğu periferik vestibüler bozukluklara bağlı olsa da, hipertansiyon ve serebro vasküler hastalıklarda eşit yaygınlıkta saptanmaktadır.

**Sonuç:** Yaşlı popülasyonda akut baş dönmesi ile başvuran hastaları hepsini periferik vestibüler bozukluk olarak değerlendirmek dehidratasyon ve hipotansiyon gibi çok kolay tedavi edilebilecek hastalıklara ve daha ileri incelenmeyi gerektiren santral sinir sistemi hastalıklarına yanlış tanı koymaya neden olabilir.

**Anahtar Sözcükler:** Acil Servis; Vertigo; Etiyoloji; Hasta Değerlendirilmesi; Geriatri.



## INTRODUCTION

Vertigo is common, representing 0.5–10% of all presentations to the emergency department and costing the USA approximately 1.6 million dollars (1). The majority of patients with vertigo can be treated after a short hospitalization period; however, severe diseases such as cerebrovascular events (CVEs) or myocardial infarction (MI) can be missed (2–4).

Vertigo is a motional illusion due to acute tonic neural activity imbalance of the vestibular system, which causes the individual to experience an internal whirling motion or a sensation of their surrounding environment turning (5). Although, vertigo is one the most common reason for emergency presentation, its evaluation, particularly with regard to the potential differential diagnosis, can be difficult.

The aims of this study was to (1) evaluate the management approach and final diagnosis of elderly patients admitted to the emergency department with vertigo, (2) to determine the etiological factors associated with presentation in the elderly, (3) to determine the treatment and examination preferences and (4) to emphasize the importance of the differential diagnosis by demonstrating that certain severe diseases could also present with vertigo.

## MATERIALS AND METHOD

Emergency presentations to the Emergency Medicine Clinics of Ankara Numune Training and Research Hospital and Amasya S.S. Training and Research Hospital were screened using the hospitals' information and management system. The data extracted from the hospital database were analyzed for 5,473 patients, aged over 60 years, who presented at the emergency department between January 2012 and March 2014, with complaints of dizziness-vertigo. Approval was obtained from Ankara Numune Training and Research Hospital institutional review board to undertake this study.

Patients diagnosed with vertigo were evaluated in different groups, as follows: treated and discharged patients; hospitalized patients; and patients who underwent radiological examinations. We also screened patients diagnosed with vertigo, and CVE, arrhythmia, MI, or infection. The rate of patients with central vertigo was determined by evaluating the radiological findings and hospital records. Other systemic or severe pathologies that can present as vertigo were evaluated from the patient files.

## RESULTS

In total, 406,475 patients over 18 years of age presented to our Emergency Medicine Clinic between January 2012 and

**Table 1—** Distribution of Patients Hospitalized with Vertigo by Departments.

Department	Number of Patients	Relative Proportions
Neurology	144	50.1%
Otolaryngology	88	30.7%
Internal Medicine	33	11.5%
Neurosurgery	13	4.5%
Cardiology	7	2.4%
Infectious Diseases	2	0.7%
<b>Total</b>	<b>287</b>	<b>100%</b>

March 2014. Of these, 5,473 patients (1.35%) over 60 years of age were included in the study; 2,963 (54%) were female and 2,510 (46%) were male, with a mean age of 71.4 years (range, 60–96 years). We identified 5,186 (94.8%) who were discharged for outpatient treatment and 287 patients (5.2%) who were hospitalized. Otorhinolaryngology and neurology departments were the common destination for admission (Table 1).

We identified 1,650 patients (30%) who had a separate diagnosis in addition to vertigo, when we disregarded their hospitalization status (Table 2). However, CVEs (n=219) and hypertension (n=226) were the most common diagnoses after benign positional paroxysmal vertigo (BPPV).

In total, 971 patients (17.8%) were seen in otorhinolaryngology clinics. Peripheral vestibular pathologies were determined in 932 patients, of which 88 had been hospitalized to otorhinolaryngology departments. A further 663 patients (12.2%) were evaluated in neurology clinics, of which 144 had been hospitalized to neurology departments.

The records showed that of 1,056 (19.3%) patients underwent central nervous system imaging with either magnetic resonance imaging (MRI) or computed tomography (CT) (Table 3). Of these, a CT scan only was performed in 739 patients, an MRI scan only was performed in 5, and both MRI and CT scans were performed in 112. Central nervous system radiological revealed acute pathologies in 151 of the 1,056 patients scanned.

An additional infectious disease was diagnosed in 54 patients (0.98%) with vertigo. It was noticed that the most common specific infectious disease diagnosed was a urinary tract infection (n=19; Table 2).

## DISCUSSION

Vertigo is among the most common presentations to the emergency department (6). In various studies, the rate of

**Table 2—** The Distribution of Patients With Diagnoses Additional to Vertigo.

Diagnosis	Number of Patients with Additional Diagnosis	Percentage of all Patients with Vertigo
Benign positional paroxysmal vertigo	447	8.1
Headache	145	2.6
Vestibular neuronitis	124	2.2
Cerebrovascular event	219	4.0
Hypertension	226	4.1
Fluid-electrolyte imbalance	93	1.6
Hypotension	96	1.5
Hypoglycemia	69	1.2
Meniere's disease	61	1.1
Hyperglycemia	81	1.4
Anemia	36	0.65
Urinary tract infection	19	0.34
Arrhythmia	17	0.31
Intracranial mass	6	0.1
Myocardial infarction	11	0.2
<b>Total</b>	<b>1650</b>	<b>30.0</b>

emergency department vertigo presentations has a reported range from 0.5%–10% (7). This epidemiological survey was one of the largest ever undertaken in medical literature, which included 406,475 patients scanned, and the results of 5,473 patients aged 60 years or older with vertigo.

The current investigation produced three major findings: 1) most patients with vertigo were discharged for outpatient treatment, 2) life-threatening central pathologies were present in 4.1% of patients with vertigo and 3) although the majority of emergency room visits for vertigo in the elderly population were caused by peripheral vestibular disorders, hypertension and cerebrovascular events were equally prevalent.

Vertigo is generally evaluated either as central or peripheral. In the study by Hain and Yacovino, central vertigo occurred in less than 5% of patients evaluated in the emergency department (8). In our study, we observed central pathology in 225 (4.1%) patients. Thus, when facing patients with vertigo, one must pay attention to the presence of other neurological signs given that life-threatening central pathologies can present with this symptom. The differential diagnosis should, therefore, include assessments for central vertigo and other severe systemic diseases that present with vertigo.

**Table 3—** Distributions of Radiological Diagnoses By Neuroimaging.

Pathology	Radiological Diagnoses of the Patients Undergoing Neuroimaging	Percentage of Patients Undergoing Neuroimaging
Acute		
ischemia-infarction-bleeding	151	14.3%
Chronic ischemic focus	69	6.53%
Intracranial mass	6	0.56%
Normal	830	78.6%
<b>Total</b>	<b>1,056</b>	<b>100%</b>

The study conducted by Norrving et al., reported that central pathologies could be missed in older patients at a rate of one in four presenting with acute vertigo attacks (9). Lee's research with 240 patients concluded that 10.4% of those presenting with isolated vertigo and later diagnosed as having a cerebellar infarct, presented with symptoms and signs that mimicked vestibular neuronitis in their history and neurological examination (3). In the study by Son et al., anterior inferior cerebellar artery infarcts were reported to present with vertigo in the context of a normal neurological examination, therefore, making it possible to confuse with peripheral vertigo. Consequently, cranial imaging is recommended for patients at high risk of CVE (10). In the study carried out by Casani et al., the rate of central vertigo that mimicked peripheral vertigo was 2.8%. Therefore, it is important to remember that severe central nervous system pathologies, such as strokes, can mimic peripheral disorders (6,11).

In our study, we observed that 1,056 patients (19.3%) who presented to the emergency department with vertigo underwent CT, MRI, or both. CT scans alone constituted 69% of the radiological imaging performed. According to the study conducted by Braun and Chase, CT scans may not be able to identify early stage ischemic pathologies, instead recommending MRI for patients when vertigo that did not resolve within 48 hours of conservative treatment (12,13).

Although MRI is more valuable for the detection of acute ischemia, its use in the emergency unit is restricted due to its high running costs and the duration of application. We concluded that the lower number of MRIs compared to CT scans in our study was due to these facts.

Details of the patients' medical histories were very useful in the differential diagnoses. Apart from identifying obvious



risk factors, effective questioning of the history of vertigo is essential. In general, vertigo episodes lasting for seconds or minutes suggest a peripheral pathology, while those lasting for hours or days indicate a central pathology (14). However, it is true that the episode can last for days in a peripheral disorder, such as Meniere's disease, and that it can last minutes in central pathologies, such as transient ischemic episodes and migraines (14). Nystagmus is also an important consideration when making a differential diagnosis. While vertical nystagmus suggests central pathologies, horizontal rotatory nystagmus is prominent in the peripheral vestibular failures (3). Meanwhile, the absence of other neurological findings does not exclude a central pathology. Schneider and Olshaker asserted that isolated vertigo can be the only symptom following strokes caused by posterior vascular deficiency (15).

Our finding that 6 patients had intracranial masses on neuroimaging is also worthy of note, and consistent with the findings of De Stefano et al. who found an intracranial mass in 7 of 211 patients followed-up for BPPV (16). Comparable to strokes, intracranial masses can therefore also mimic benign peripheral vestibular pathologies. In light of the data obtained from the high number of patients in this study, we suggest that clinicians have a lower threshold for requesting imaging to prevent severe central pathologies being overlooked.

Severe cardiovascular pathologies, such as MI, can often present with vertigo (17). In our study, 11 patients with vertigo were also diagnosed with MI, while 17 were diagnosed with arrhythmias. Furthermore, vertigo was the only symptom in these 28 patients on initial presentation. Vertigo can be a symptom of main cardiac pathologies, including acute coronary syndrome (ACS) and arrhythmia. Therefore, we suggest that all patients presenting with vertigo undergo electrocardiography.

Systemic or orthostatic hypotension, pre-syncope and syncope can each cause vertigo by reducing cerebral perfusion (18,19). Furthermore, dehydration and electrolyte deficiency can cause vertigo. In our study 96 patients with vertigo (1.5%) were diagnosed with hypotension, 226 were diagnosed with hypertension (4.1%) and 93 (1.6%) were diagnosed with fluid-electrolyte deficiency. By measuring blood pressure and determining fluid-electrolyte levels via simple biochemical tests, treatment can be initiated rapidly.

It is noteworthy that the most common specific infectious disease associated with vertigo was urinary tract infection. However, upper respiratory tract infections are common in patients with a history of vestibular neuronitis, and only the

specific diagnosis of vestibular neuronitis may have been recorded in the digital records as a result, thereby potentially explaining the greater number of urinary tract infections. Nevertheless, we suggest that further research is needed to evaluate the relationship between urinary tract infections and vertigo in the elderly.

Anemia can also cause vertigo and other neurological symptoms by causing cerebral hypoxia (20). In our study, 36 patients had anemia and vertigo, with 29 requiring transfusions. Thus, severe anaemia can cause vertigo. The complete blood count, which is inexpensive and simple test, can be very valuable in detecting anaemia. In addition, hypoglycemia, hyperglycemia and insulin fluctuations are associated with vertigo, particularly through neuroglycopenia (21). In our study, 81 (1.4%) and 69 (1.2%) patients with vertigo were additionally diagnosed with hyperglycemia and hypoglycemia, respectively.

The relationship between migraine and vertigo has been demonstrated in various studies. In the epidemiological study conducted by Furman et al., migrainous vertigo had a prevalence of 1% in society (22). Headache is a condition frequently encountered during emergency department visits; however, a disease such as migrainous vertigo, which is common in society, should be considered in the differential diagnosis.

Peripheral vestibular diseases are responsible for most episodes of acute vertigo. BPPV, vestibular neuronitis and Meniere's disease are the most common of these, with BPPV being the most prevalent of all (23). In this study, 632 patients (11.4%) were diagnosed with specific peripheral vestibular diseases. Studies in associated literature report that BPPV can be effectively diagnosed by the Dix-Hallpike maneuver and treated by the Epley maneuver (24,25). Vestibular neuronitis is the second most common peripheral vestibular pathology, and is typically associated with an upper respiratory tract infection. Sudden-onset vertigo that persists without other neurological or audiological findings is the typical presentation. In our study, vestibular neuronitis occurred in 124 patients (2.2%). Meniere's disease occurred in 61 patients (1.1%) with vertigo. With a good history, this can be diagnosed by the characteristic report of tinnitus, vertigo, aural congestion, and fluctuating hearing loss (5).

Vertigo is a symptom of both minor and major disorders. On the one hand, it can be caused by simple metabolic, haemodynamic or peripheral vestibular pathology. On the other hand, it can result from severe cardiac, systemic or neurologic pathologies. Among the elderly population, assessing all cases of acute vertigo as presentations of peripheral vestibular defi-



ciency can lead to missed diagnoses of both readily treated pathologies, including dehydration and hypotension, and serious central pathologies that require further investigation.

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