



Vascular risk factors in patients with peripheral vestibular disorders

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Abstract

Objectives: The present observational retrospective study investigates whether there are differences in vascular risk factors between patients with spontaneous benign paroxysmal positional vertigo (BPPV) and those with Ménière's disease (MD).

Patients and methods: Out of a series of 1617 consecutive admitted patients, 36 presented isolated recurrent vertiginous events. Twenty patients with BPPV and 16 with MD were compared. In addition to extensive audio-vestibular investigations, all patients had a complete cardio-vascular work-up. A computed tomography (CT) and a magnetic resonance imaging (MRI) of the brain were performed in all patients. The vascular risk factors and the CT/MRI findings were compared between the patients with BPPV and MD. **Results:** Small old cerebral infarcts were observed in 25% of the BPPV and 31.2% of the MD patients, although none of them had a prior history of stroke. All other vascular risk factors tended to be more frequent in the former group although only a statistically significant difference was found for coronary artery disease ($P = 0.03$).

Conclusions: In this pilot study BPPV does not appear to be such a benign condition but can indicate progression of general atherosclerotic disease.

Key words: Peripheral vestibular syndromes; benign paroxysmal positional vertigo; ménière's disease; cerebral infarcts; vascular risk factors.

Introduction

Although vertigo is one of the most common symptoms in daily clinical practice the co-morbidities of different peripheral vestibular syndromes are not very well known. The prevalence of vertigo is age depending (Davis and Moorjani, 2003). Benign paroxysmal positional vertigo (BPPV) is the most common vestibular syndrome (Brandt, 2003; Neuhauser *et al.*, 2001). It is caused when calcium carbonate material originating from the macula of the utricle falls into one of the semicircular canals

(Fife, 2009). Numerous factors associated with BPPV have been reported, including advancing age, female gender, other ear diseases (Baloh *et al.*, 1987), head trauma (Gordon *et al.*, 2004), migraine (Uneri, 2004), diabetes (Cohen *et al.*, 2004) and osteoporosis (Vibert *et al.*, 2003). Migraine is also related to Ménière's disease (MD) (Neuhauser and Lempert, 2004). As advancing age promotes the appearance of vertigo but also the occurrence of stroke (Lee *et al.*, 2007), the present study investigates whether vascular risk factors could be co-morbidities in patients with BPPV.

Patients and methods

Out of series of 1617 consecutive patients admitted to the Neurological Department of the Ghent University Hospital during 2002 and 2007 for an acute neurological event, 36 were investigated for a first isolated vertigo attack. Patients with vertigo related to a traumatic brain injury, a brainstem stroke or a tumour in the posterior fossa were excluded from the study.

A vestibular vertigo was retained in 36 patients with a final diagnosis of BPPV in 20 and of MD in 16 of them. The definition of vestibular vertigo required a history of vertigo with an illusion of rotation or provocation of vertigo by positional changes of the head or dizziness with accompanying symptoms including oscillopsia, nausea and imbalance. BPPV was confirmed by a positive Dix-Hallpike test. MD included in addition to the vertigo, ringing in the ears, and some loss of hearing (Von Brevern *et al.*, 2007).

A detailed medical history, including vascular risk factors and previous treatments, was obtained from all the patients on admission. Arterial hypertension, hypercholesterolaemia and diabetes were considered as risk factors when the patients were already under drug treatment for their ailment.

All admitted patients had, according to a standard protocol used in the Neurological Department of the University Hospital, a complete clinical evaluation and underwent a full cardiovascular examination, including electrocardiogram (ECG), chest X-ray, routine blood analyses, Doppler sonography of the extracranial arteries, 24- to 72-h ECG monitoring as well as transoesophageal Doppler or transthoracic echography of the heart. They all had extensive audio-vestibular investigations. Computed tomography (CT) and magnetic resonance imaging (MRI) of the brain, focused on the posterior fossa, were performed in all patients. Age, gender, vascular risk factors, CT/MRI findings and outcome were compared between the patients with BPPV and MD. Univariate comparisons of unpaired groups were done with the Fischer's exact test for categorical data. The non-parametric Mann-Whitney U-test was used to compare continuous variables. The significance level was set at $\alpha = 0.05$, two-tailed.

Results

The patients of both groups were on average of the same age, respectively 63.2 (SD 9.6) years for those with BPPV and 65.6 (SD 9.2) years for those with MD ($P = 0.57$). Also the gender distribution was not statistically different with 55.0% females in the former and 31.3% in the latter group ($P = 0.10$). On CT and/or MRI a small old infarct was detected in 5 patients of each group, although none of the patients had a history of stroke or trauma. In one patient with BPPV and one with MD the infarcts were lacunar and located in the basal ganglia. A small cortical cerebellar infarct was seen in one patient of each group. In the other patients the in-

farcts had a supratentorial cortical distribution. The incidence of old infarcts was not statistically different between the patients with BPPV and MD ($P = 0.71$). All other vascular risk factors tend to be more frequent in the BPPV patients but only for coronary artery disease a significant statistical difference could be demonstrated ($P = 0.03$) (Table 1). Recurrence of the vertiginous events within one year occurred in only 5% of the patients with BPPV, while in the MD group they recurred in 12.5% despite adequate treatments ($P = 0.57$).

Discussion

BPPV is generally considered as a frequent and benign condition in the elderly (Kao *et al.*, 2009). Although a recent survey did not detect an increased prevalence of diabetes, arterial hypertension, migraine and obesity compared to the general population (Warninghoff *et al.*, 2009) our study demonstrates a trend of more vascular risk factors in patients with BPPV compared to those with MD. A previous study also showed a higher incidence of abnormal intima-media thickness on carotid ultrasonography in patients with BPPV compared to those with other peripheral vestibular syndromes (Wada *et al.*, 2008). On the other hand, smoking was found more frequently in control subjects than in BPPV patients (Sunami *et al.*, 2006). This observation is not confirmed in the present study. The high number of asymptomatic cerebral infarcts in the patients with BPPV as well as in those with MD is not surprising as a previous neuropathological study showed already an incidence of 22% "silent" infarcts in an overall series of stroke patients (De Reuck *et al.*, 1981). Our findings suggest that spontaneous

Table 1

Percentage comparison of vascular risk factors in patients with benign paroxysmal positional vertigo (BPPV) and in patients with Ménière's disease (MD)

Items	BPPV (N = 20)	MD (N = 16)	Fischer Exact Test
Cerebral infarcts	25.0	31.2	0.71
Arterial hypertension	60.0	37.5	0.11
Coronary artery disease	40.0	6.3	0.03
Isolated atrial fibrillation	15.0	6.3	0.61
Peripheral artery disease	10.0	6.3	1.0
Cardiac valve disease	10.0	0.0	0.49
Hypercholesterolaemia	35.0	18.8	0.46
Diabetes	20.0	12.5	0.67
Migraine	25.0	18.8	0.71
Smoking	10.0	0.0	0.49

BPPV is not a so benign condition. It may indicate that patients with BPPV have a greater tendency for vascular risk factors than those with MD. However, as this is only a small pilot report further confirmation of a possible link between vascular risk factors and BPPV requires further investigation in a large-based population.

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