Dizziness and migraine: a causal relationship?

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Summary

Both migraine and dizziness are very frequent complaints, but the comorbidity of the two disorders is higher than it might be expected to be on the basis of chance alone. This implies a possible causal relationship, but definite diagnostic criteria for migraine-related vertigo are still lacking. Very recent attempts in this direction have shown that migraine may be the third leading cause of vertigo and that migraine-related vertigo may be effectively treated.

A review of the literature on this topic, which includes some preliminary data of our own, demonstrates the difficulty in pinpointing migraine-associated vertigo as a clearly-defined entity. However, there is a measure of agreement on a few points: the spells of vertigo occur in patients who habitually suffer from motion sickness, and who have a history of migraine, either without or with aura; the delay between migraine and vertigo onset may be several years; migraine-related vertigo may be described as rotatory and/or as a feeling of unsteadiness, and single spells can occur without any other accompanying symptoms, however, when spells do occur in association with headache, they usually precede it. The vertigo duration may be shorter or longer than that of the migraine aura since it ranges from a few seconds to a continuous condition of unsteadiness.

KEY WORDS: comorbidity, migraine, review, vertigo.
Basilar artery migraine

In 1961, Bickerstaff (11) identified a kind of usually throbbing and occipital headache that he named "basilar artery migraine" since it was heralded by and/or associated with symptoms, including vertigo, that could be linked with a transient dysfunction of structures supplied by the basilar artery or its branches. According to the IHS classification, BAM is a migraine with aura (the aura symptoms clearly originating from the brainstem or from both the occipital lobes), and can be diagnosed: a) when the headache fulfills the criteria for migraine with aura; b) in the presence of two or more aura symptoms of the following types: visual symptoms in both the temporal and nasal fields of both eyes; dysarthria; vertigo; tinnitus; decreased hearing; double vision; ataxia; bilateral paraesthesias; bilateral pareses; decreased level of consciousness.

Parker (12) analysed the literature data on BAM and highlighted some common features: the age at onset is usually before 20 years (in agreement with Bickerstaff) and females are more frequently affected than males (76% of the patients described by Bickerstaff) and females are more frequently positive for migraine (ranging in different reports from 73% to 86%, below the 94% originally reported). Caloric testing was abnormal in 48% of the patients, whereas pure tone audiometry was abnormal only in 2%.

Abu-Arafeh et al. (17) described paroxysmal vertigo of childhood (PV), a syndrome very similar to PBVC. The features of PV were delineated on the basis of a sample of 45 children (drawn from a group of 1754 subjects) who presented with at least 3 episodes of sudden rotatory vertigo without loss of consciousness, or any other neurological or auditory abnormalities. The mean age at onset was 8 years, the mean duration of a single spell was about 6 minutes; other symptoms could be associated with (but never lasted longer than) the vertigo. These included: pallor (49%), nausea (36%), feeling unwell (33%), noise intolerance (13%), light intolerance (11%), anorexia (11%) and vomiting (4%).

Several factors supported the possible causal relationship between PV and migraine: the prevalence of migraine among the PV children was higher than that found in aged-matched controls without PV (24% vs 10.6%), as was that of a positive family history of migraine (42% vs 18%). Moreover, some of the PV children presented with other possibly migraine-related symptoms: abdominal migraine (2%), recurrent limb pain (2%), cyclic vomiting (4%), other (20%).

The trigger factors for PV were similar to those for migraine, most commonly tiredness, but also stress, missing a meal, travel, climate, bright light, and lack of sleep. Moreover, Abu-Arafeh reported that in a group of 159 children suffering from migraine, 68.5% (during attacks) and 8.8% (outside attacks) complained of vertigo; this was diagnosable as PV in 8.8% of them (versus a prevalence rate for PV in controls of 2.6%).

Similar findings were reported by Drigo et al. (18), who also hypothesised the existence of a causal relationship between PBVC and migraine. In addition, this study showed that PBVC could be induced by the same pharmacological provocative tests used in the study of migraine.

Benign recurrent vertigo

In 1979 Slater (19) described, in 7 adult patients, an entity called benign recurrent vertigo (BRV). These patients presented with recurrent spells of paroxysmal vertigo, more frequently in the morning, usually lasting from 30 minutes to 4 hours (although the overall range was actually much broader, i.e., from a few minutes to 2-3 days), in association with autonomic but not with typical aura or auditory symptoms. The patients had a negative history for both head trauma and cerebrovascular diseases. For a period of a few days following a spell of BRV, patients could present brief episodes of positional vertigo, before becoming symptom-free. Pa-
Migraine-related vertigo

Several more recent papers have aimed to establish the features of vertigo-associated migraine, implying the existence of a causal relationship between the two diseases. After reviewing the inclusion criteria used, we will attempt to summarise the main clinical features of vertigo-associated migraine, according to these reports. On the basis of these criteria, Furman et al. (27) recently proposed diagnostic interview for determination of migrainous vertigo.

We would like to include here some preliminary data obtained in our own laboratory. We considered two groups of patients. The first group drawn from 452 patients presenting balance disturbances and referred for consultation either to a neurological or to an ENT outpatient department; 106 of these patients were also affected by migraine (94 without and 12 with aura) and in 53 of them (the vertigo group, 46 without aura, 7 with aura), their migraine was the most likely explanation for at least 5 attacks. The second group (27 patients - the headache group: 21 migraine without aura, 5 migraine with aura, 1 tension headache) was derived from a total of 75 patients suffering from headache. None of these patients had ever sought medical advice about balance problems. However, when specifically asked about dizziness or
As regards the natural history of the two disorders, all the studies indicated that, in around 90% of patients, the onset of dizziness is delayed by several months/years with respect to the migraine onset (6,8,10,26). This was true both of our vertigo (83.8%) and of our headache group (92.3%).

Another common finding was the prevalence of motion sickness, which was higher than that recorded in the general population: 42% and 25% in classical and common migraine respectively in Kuritzky’s series (5), 20.5% and 30.7% in our vertigo and headache groups respectively, and 48% in Johnson’s series (26).

The other clinical features of dizziness are reported in Table I. These features show a great variability among different studies and this makes it impossible to establish consistent clues on the basis of which migraine-related dizziness might be diagnosed. As already mentioned, this variability stems partly from differences in the selection criteria applied. Another possible explanation, according to our own impressions, is that migraine-related dizziness, if misdiagnosed and left untreated, may change its features over time, and

| Table I - Clinical features of patients reported in papers on migraine-associated vertigo. |
|----------------------------------|------------------|-----------------|-----------------|-----------------|------------------|
|                                  | REF. 10          | REF. 23         | REF. 24         | REF. 25         | REF. 26          |
| **AGE AT VERTIGO ONSET (MEAN; RANGE/YS)** | 46.4            | 35; 6-67        | NA; 7-83        | 39.6; 7-72      | 45; 16-89a       |
| **ATTACKS WITH BOTH VERTIGO AND HEADACHE** |                  |                 |                 |                 |                  |
| frequency (A, ST)               | 45.5% A         | 5.4%            | NA              | 68%            | 9% A             |
|                                 | 48.5% STb       |                 |                 | 28% ST         | 30.6% A          |
| vertigo before headache         | NA              | 60%             | NA              | NA             | NA               |
| vertigo + headache together     | NA              | 40%             | NA              | NA             | 27%c             |
| **KIND OF VERTIGO**             |                  |                 |                 |                 |                  |
| rotatoryd                       | NA              | 53%             | 21%             | 83.3%          | 44%              |
| dizziness                       | NA              | 15%             | 79%             | 40.5%          | 17%              |
| both                           | NA              | 32%             | NA              | 24%            | 39%              |
| **DURATION OF VERTIGO**         |                  |                 |                 |                 |                  |
| seconds                        | 18.2%           | 7.1%            | 20%             | 8.6%           | 20.2%            |
|                                |                 |                 |                 | 28.9%          | 37%              |
| minutes                        | 33.3%           | 31%c            | 30.7%           | 13.5%          | 26.3%            |
|                                |                 |                 |                 | 14.8%          |                  |
| hours                          | 21.2%           | 13.1%           | 43%             | 39.4%          | 25.8%            |
|                                |                 |                 |                 | 21.1%          | 18.5%            |
| days                           | 27.3%           | 48.8%           | 47%             | 21.1%          | 21.3%            |
|                                |                 |                 |                 | 23.7%          | 29.6%            |
| **FREQUENCY OF VERTIGO**        |                  |                 |                 |                 |                  |
| continuous/daily               | NA              | NA              | NA              | 5.2%           | 52%              |
|                                |                 |                 |                 |                | 62.8%            |
| weekly                         | NA              | NA              | NA              | 29.5%          | 18%              |
|                                |                 |                 |                 |                | 11.4%            |
| monthly                        | NA              | NA              | NA              | 40%            | 28%              |
|                                |                 |                 |                 |                | 11.4%            |
| yearly                         | NA              | NA              | NA              | 26.3%          | 2%               |
|                                |                 |                 |                 |                | 14.3%            |

Abbreviations: REF. = reference number; A/ST= always/sometimes; NA= datum not available; G1= our vertigo group; G2= our migraine group.

a these data refer to the age at consultation, but the spells of vertigo actually started from 3 months to 44 years previously.
b these high figures stem from the inclusion criteria adopted to define migraine-related vertigo.
c in our two groups, vertigo could start after headache.
d many studies do not differentiate between rotatory object motion and self-motion; in our data rotatory refers to object motion only. It was felt that this distinction may be useful since it suggests the presence of nystagmus during vertigo.

* both for the duration and for the frequency of vertigo we tried to summarise the data in homogeneous groups for all studies.
fi in this study minutes and hours mean up to and more than 2 hours respectively.
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evolve from episodic, recurrent and short-lasting spells into a constant feeling of unsteadiness. Although our data are preliminary, they show that the features of vertigo/dizziness are very similar in the two groups. The main differences concern the frequency and the intensity (not stated in the table) of the spells, namely the two factors that prompt the patient’s decision to seek (as in the vertigo group) or not to seek (as in the migraine group) medical advice.

In conclusion, there is a growing tendency to view migraine as a complex disease (28), and in this scenario the comorbidity with vertigo deserves special attention (29). According to the figures cited above, up to around 9% of dizzy patients are affected by migraine-related vertigo, and migraine is the third leading cause of vertigo. Moreover, since it is likely the two disorders share the same pathophysiological mechanisms, migraine-related vertigo should be medically treatable. Effective treatment would prevent the disorder from becoming chronic and from being complicated by a phobic component.

At present we suggest a highly pragmatic approach to the problem of migraine-related vertigo: physicians encountering vertigo patients who have a personal history of migraine may bear in mind this possible diagnosis, starting treatment only after they have ruled out all other possible causes of the vertigo. Given the lack of definite diagnostic criteria, and the fact that the ones suggested by the 1988 IHS classification – this would appear to hold true also for criteria that are being proposed for the new classification of migraine with aura, including basilar type migraine – do not fit particularly well with what we might expect, on the basis of the above-mentioned studies, to be the features of migraine-related vertigo, we would also suggest that the association of vertigo and headache in any given spell should not be considered mandatory, and that vertigo should not be required to reflect the time pattern of the aura.

Finally, experimental models of migraine (30) may – by answering the questions is vertigo an aura symptom or a reflection of the heterogeneity of migraine? (28); do central rather than peripheral mechanisms explain vertigo? (31) – help to further our understanding of the pathophysiological mechanism of migraine-related vertigo (27) and thus to lead to a better delineation of its clinical features and as a result to improved diagnostic criteria.

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