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Clinical study

Chronic migrainous vertigo

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Summary A series of 16 subjects is described who presented with chronic vertigo that was thought to be migrainous in nature. The vertigo occurred on a daily basis and had been present for six months or more. Common symptoms included motion-induced dizziness, positional vertigo and motion sensitivity. Investigations were frequently normal apart from the finding of atypical positional nystagmus in four subjects and unilateral vestibular hypofunction in two subjects. It was frequently not possible to make a diagnosis of migraine on the basis of International Headache Society criteria, however the dramatic beneficial response to anti-migraine therapy supported the hypothesis that the vertigo was migrainous in nature.

Keywords: migraine, vertigo, treatment

INTRODUCTION

Migraine is a common disorder that has been associated with a number of vestibular syndromes. The relationship between headache and vertigo has been known for many years since the writings of Living in 1873 (quoted by Kayan and Hood).[14] Vestibular symptoms may be either spontaneous or motion-induced[6,9,13,14] and are estimated to occur in 25–54% of unselected migraine subjects.[14,18] Vertigo may occur as a prodromal feature in migraine with aura, at the same time as the headache, or during the headache-free period.[8,9,14,18] Other entities such as benign recurrent vertigo[19,24] and benign paroxysmal positional vertigo (BPPV) have been described in association with migraine,[3,5,12,14] and motion sickness is also reported to be more common in migraineurs.[6,8,13–15]

A relationship between Meniere's disease and migraine has been postulated by some authors,[1,11] however the strength of this association has been questioned by the suggestion that migraine might be the cause of vertigo in patients with "vestibular Meniere's disease",[22] an entity that is no longer recognised by the American Academy of Otolaryngology-Head and Neck Surgery.[7] Auditory symptoms apart from tinnitus and phonophobia are usually inconspicuous in migraine,[2] however an association with sudden hearing loss[16,26] and fluctuating low frequency hearing loss[10,13,17,21] has been reported.

Despite the common association of vertigo with migraine, the International Headache Society criteria for migraine only recognise adult onset migrainous vertigo in the setting of basilar migraine.[20] Basilar migraine is probably the most dramatic manifestation of vestibular migraine, with headache and vertigo being accompanied by symptoms of brainstem or occipital lobe dysfunction.[4] The term "vestibular migraine" has been proposed to describe migrainous vertigo that does not fulfil the criteria for basilar migraine.[9]

Some authors have described patients with vestibular symptoms persisting for days to weeks in the setting of migraine.[6,8] Chronic motion-induced dizziness or vertigo lasting many months or more in the setting of migraine has not been clearly documented or characterised. This study was a retrospective analysis of the clinical and laboratory abnormalities in a group of subjects presenting with chronic vertigo that was thought to be of migrainous origin. An abstract which included some subjects from this group has been published previously.[27]

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METHODS

The 16 subjects included in this study had a history of chronic dizziness for at least six months prior to medical assessment. Many of the subjects had daily symptoms, while others had bouts of weeks to months duration that were separated by only short symptom-free periods. Subjects with other possible causes for their dizziness were excluded from the study, particularly if there was significant auditory involvement.

All of the subjects were interviewed and examined personally. Many underwent oto-neurological investigations including pure tone audiometry, brainstem auditory evoked responses (BAER), electronystagmography, caloric and rotational chair testing. Some subjects also had magnetic resonance (MR) scans.

Possible abnormalities defined on BAER included poorly defined waveforms, abnormal I–III and I–V latencies, and interlatency differences. Bithermal caloric responses were performed with 40 s irrigations of water at temperatures of 30 and 44 °C. A significant canal paresis was defined as a greater than 25% difference in maximal nystagmus slow phase eye velocity between sides. Directional preponderance was defined as a greater than 30% difference between the sums of right and left beating nystagmus. Positional nystagmus was recorded by electro-oculography (EOG). Rotational chair responses were recorded during sinusoidal rotation between 0.1 and 0.4 Hz, and during trapezoidal acceleration using 20 °/s^2 stimuli. Measures were made of vestibulo-ocular reflex (VOR) gain, phase and asymmetry.

All subjects had a history of headaches, however the features were frequently non-specific and, in many cases, the headaches did not fulfil the International Headache Society criteria for the diagnosis of migraine.[20] The diagnosis of migrainous vertigo was therefore only able to be confirmed by the response to prophylactic migraine therapy.[5,9] A successful response was defined as a total or near-total response (>90% subjective improvement in vestibular symptoms) for at least three months. Subjects with less marked partial responses were not included.

RESULTS

A total of 16 subjects with an age range of 14–58 years were included in the study (Table 1). The mean duration of vertigo was 32 months with a range of 6–120 months. Most subjects presented with chronic motion-induced dizziness. Some subjects also gave a history that was suggestive of BPPV, with attacks of vertigo provoked by such movements as recumbency, rolling over in bed and head movements in the pitch plane. A large number of subjects (69%) gave a history of motion sickness or intolerance, often dating back to a young age. In some cases this was one of the major presenting symptoms.

A history of headache was often not volunteered initially, particularly as the vertigo was usually the dominant presenting feature. All subjects admitted to this problem when questioned, and some (38%) gave a past history that was strongly suggestive of migraine. The headaches were often frequent and non-specific. In many cases there did not appear to be any major temporal relationship between the headaches and vertigo.

The following case summaries illustrate the types of clinical presentation.

Case no. 3

A 24 year old lady gave a history of recurrent bouts of vertigo, nausea and vomiting of two to three days duration since the age of 10. These bouts occurred initially around twice per year. During the year prior to assessment her symptoms had become more constant. She complained of feeling unstable, nauseated and dizzy. At times she felt as though she was on the deck of a ship. In addition, she would experience bouts of positional vertigo. Visual symptoms were also prominent. She was unable to sit in a movie theatre, look up or travel in elevators because of visual vertigo. She had been experiencing frequent frontal headaches and had also been prone to motion sickness since childhood. There were no abnormal findings on neurological examination or vestibular function tests. There was a complete resolution of her headaches, vertigo and disequilibrium following the commencement of pizotifen 0.5 mg daily.

Case no. 5

A 26 year old lady presented with a three and a half year history of recurrent vertigo with a prominent positional component. These episodes would occur around 10 to 15 times per year, lasting up to one to three days. During this time, she had also been experiencing less severe chronic positional symptoms between attacks of severe vertigo. This would occur when bending over and lying on her left side, to the extent that she had been unable to lie flat since the onset of her symptoms. She had a history of motion sickness dating back to childhood and this had become significantly worse prior to the initial assessment. There were no associated auditory symptoms. She gave a history of "tension" discomfort in the frontal region with phonophobia after some of the more severe episodes of dizziness. Neurological examination was normal including a Hallpike manoeuvre performed on several occasions. Audiometry and vestibular function tests were also normal. Her symptoms resolved completely on pizotifen, 0.5 mg daily.

The vertigo was usually described as motion-induced and, in some cases was suggestive of BPPV. However none of the subjects had evidence of objective positional nystagmus to support the diagnosis of BPPV. Most of our subjects had normal or near normal investigations, though four cases had a significant degree of atypical positional or positioning nystagmus on EOG that reflected the motion-induced nature of their symptoms (Table 1). Only 2 of 10 subjects tested had evidence of a significant unilateral hypofunction on caloric testing, an alternative cause of chronic motion-induced dizziness, that has been described previously in some subjects with migraine.[6,9,21]

Prophylactic medications used for treatment of migraine included pizotifen (0.5–2 mg daily), propanolol (80–240 mg daily), verapamil (80–160 mg daily) and dothiepin (25 mg daily). All of these medications appeared to have efficacy in this group of subjects. No comment could be made about their relative efficacy in this uncontrolled sample.

CONCLUSIONS

Although vertigo is a common symptom in subjects with migraine, the association of migraine with chronic vertigo and disequilibrium has not been well documented previously. Although this is considered to be an uncommon and atypical presentation of migraine, it is important to recognise this syndrome due to the fact that treatment was successful in relieving all or most of the symptoms, even in subjects who had been unwell for years.

The dizziness in this group of patients was described as spontaneous rotatory vertigo or motion-induced dizziness. Visual motion sensitivity was a frequent symptom. In some cases, motion sickness was the predominant presenting feature, an association that has been described previously.[6,8,13–15]

Abnormal vestibular investigations that have been documented in subjects with vestibular migraine include unilateral or bilateral reductions in vestibular function, abnormal directional preponderance, spontaneous or positional nystagmus, as well as impaired smooth pursuit and optokinetic nystagmus.[8,9,13,14,21,23,25] The majority of subjects had normal studies. We found no evidence of central abnormalities that have been described previously by other authors.[9,23]

The cause of vertigo in migraineurs is unknown. In their series of 91 subjects, Cutrer and Baloh documented a history of vertigo which they attributed to increasing circulating levels of neurotransmitters.[8] This theory would be consistent with the fact that studies have described stronger than normal vestibular responses in some migraineurs.[14] This phenomenon may also explain the heightened sensitivity to motion sickness that was frequently documented. It has been postulated that a common defect in brain and inner ear calcium channels might be responsible for symptoms of headache and vertigo.[2]

Although it is possible that the vestibular symptoms in this group of subjects with possible migraine were an incidental, unrelated finding, the response of the vestibular symptoms and headaches to anti-migraine treatment is good evidence that there was a migrainous basis for these symptoms.[5,9,13] It is not possible to exclude a placebo effect of the treatment, however most patients had received numerous trials of drug therapy, particularly vestibular sedatives, with little or no benefit. The history of headache in these cases did not often fulfil the International Headache Society criteria for the diagnosis of migraine. However other atypical migraine variants such as optical migraine may occur in the absence of any significant headache and are also considered to have a similar pathophysiology. The fact that this patient group does not meet these criteria, does not exclude the possibility of a migrainous disorder underlying the symptoms. The response to treatment is presently the only way of confirming the diagnosis of migraine in this group of subjects. I am not aware of any other non-migrainous vestibular syndromes that might have responded to the anti-migraine medications used in this study. Whether this presentation should be termed migraine-associated dizziness or vestibular migraine is speculative. The important conclusion from this study is the marked success of the treatment

Table 1 Clinical and laboratory features of subjects

Subject, sex, age	Symptoms	Duration	History of motion sickness	Headache	Past history of migraine	Vestibular investigations	MR I result	Treatment	Follow-up
1. M 39	Brief episodes of spontaneous and motion-induced dizziness, as well as disequilibrium	9 months	No	Mild frontal headaches every week	No	Normal	NP	Pizotifen 0.5 mg daily	Complete resolution
2. M 50	Positional vertigo, headache with more severe bouts	9 months	NA	Increasing headaches over one year with constant headache for 2 months	Yes	NP	NP	Dothiepin 25 mg daily	Marked improvement in headaches and vertigo
3. F 24	Lightheaded, swaying sensations, positional vertigo, nausea. Previous bouts of vertigo, nausea and vomiting since age 10	12 months	Yes	Frequent, mild frontal headaches	No	Normal	NP	Pizotifen 0.5 mg daily	Marked improvement in headaches and vertigo
4. M 58	Fluctuating vertigo and disequilibrium, like "seasickness". Initially only when on boats but more recently on land	3 years	Yes	Frontal headaches with photophobia for 1 year	Yes	Direction changing positional nystagmus	NP	Pizotifen 0.5 mg daily	Complete resolution
5. F 26	Intermittent bouts of severe positional vertigo. Between these attacks unable to lie flat in bed and dizzy when bending	3 1/2 years	Yes	Infrequent "pressure" in frontal region and occipital pain with more severe bouts of vertigo	No	Normal	NP	Pizotifen 0.5 mg daily	Complete resolution
6. F 47	Daily episodes of nausea and dry retching on standing out of bed, sometimes in association with mild dizziness and unsteadiness	1 year	No	Frequent mild afternoon frontal headaches	No	Left canal paresis on caloric testing	Normal	Propanolol 40 mg bd	Complete resolution
7. F 49	Motion-induced dizziness	1 year	NA	Frequent frontal and occipital headaches	NP	Asymmetry on rotational chair testing	NP	Propanolol 40 mg bd	Headaches resolved. Marked improvement in dizziness
8. F 14	Motion-induced dizziness	2 years	Yes	Frequent dull occipital headaches with nausea and photophobia	No	NP	NP	Pizotifen 1.0 mg daily	Complete resolution
9. F 27	Daily vertigo, often positional in nature. Also visual vertigo, worse with menstruation. Recurrent vertigo since age 11	4 years	Yes	Generalised headache with nausea and photophobia every few weeks	Yes	Mild right beating spontaneous and static positioning nystagmus in darkness	Normal	Pizotifen 2.0 mg daily	Complete resolution of vertigo and major improvement in headaches

10. M 48	Fluctuating positional vertigo	3 years	Yes	Unilateral headaches several times weekly with nausea, photophobia and photophobia	No	NP	NP	Pizotifen 1.5 mg daily	Marked improvement in headaches and dizziness
11. 45 F	Positional vertigo with intermittent episodes of more severe vertigo and vomiting	6 months	NA	History of "heavy heads"	Yes	Atypical positional nystagmus – counterclockwise torsional nystagmus during positional testing, left canal paresis on caloric testing	Non-specific small white matter lesions	Pizotifen 1 mg daily	Almost complete resolution of vertigo and "heavy heads"
12. 29 F	Persistent rocking sensation aggravated by rapid head movements and postural changes	6 months	Yes	Bitemporal headaches with photophobia on most days	Yes	Normal	Normal	Verapamil 40 mg bd	Major improvement in dizziness, headaches less severe
13. 45 F	Frequent bouts of lightheadedness and falling sensation, aggravated by motion. Also episodic nausea and unsteadiness of several weeks duration	10 years	Yes	Frequent right sided frontal headaches	No	NP	NP	Pizotifen 0.5 mg daily	Complete resolution of dizziness and headaches
14. 45 F	Motion-induced and visual vertigo, often positional, with some spontaneous episodes	1 year	Yes	Frequent frontal headaches with phonophobia for 18 months	No	NP	NP	Verapamil 180 mg daily	Almost complete resolution of vertigo, headaches much improved
15. 29 F	Motion-induced vertigo often when supine or rolling in bed. Also spontaneous episodes and visual motion aggravation	10 years	Yes	Headaches up to 4 times weekly. When severe, associated with photophobia, nausea and vomiting	Yes	Mild left beating horizontal and torsional static positional nystagmus during left Hallpike manoeuvre	NP	Propanolol 40 mg bd	Complete resolution of dizziness, headaches much improved, motion sickness better
16. 15 F	Motion-induced and visual vertigo, frequent nausea and vomiting	15 months	Yes	Frequent short-lived sharp left frontal headaches	No	NP	NP	Pizotifen 0.5 mg daily	Almost complete resolution of headaches and vertigo

NP = not performed, NA = not assessed, MRI = magnetic resonance imaging.

in this group of patients who had been quite disabled for prolonged periods.

Frequently, the history of headache was not volunteered, presumably because it was not considered important by the subjects. It is therefore crucial to enquire about a history of headache in subjects with vertigo, as the diagnosis of migrainous vertigo may otherwise be overlooked. Furthermore, a trial of anti-migraine therapy may be indicated in otherwise unexplained cases of vertigo, even if there is no convincing history of headache. It is also interesting to note that vestibular rehabilitation has recently been reported to be a successful treatment in a group of subjects with migraine-associated dizziness.[28]

REFERENCES

1. Atkinson M. Meniere's syndrome and migraine; observations on a common causal relationship. Ann Int Med 1943; 18: 797–808.
2. Baloh RW. Neurotology of migraine. Headache 1997; 37: 615–621.
3. Baloh RW, Honrubia V. Childhood onset of benign positional vertigo. Neurology 1998; 50: 1494–1496.
4. Bickerstaff ER. Basilar artery migraine. Lancet 1961; 1: 15–17.
5. Bikhazi P, Jackson C, Ruckenstein MJ. Efficacy of antimigrainous therapy in the treatment of migraine-associated dizziness. Am J Otol 1997; 18: 350–354.
6. Cass SP, Furman JM, Ankerstjerne JKP, Balaban C, Yetiser S, Aydogan B. Migraine-related vestibulopathy. Ann Otol Rhinol Laryngol 1997; 106: 182–189.
7. Committee on hearing and equilibrium: committee on hearing and equilibrium guidelines for the diagnosis and evaluation of therapy in Meniere's disease. Otolaryngol. Head Neck. Surg. 1995; 113: 181–185.
8. Cutrer FM, Baloh RW. Migraine-associated dizziness. Headache 1992; 32: 300–304.
9. Dieterich M, Brandt T. Episodic vertigo related to migraine (90 cases): vestibular migraine? J Neurol 1999; 246: 883–892.
10. Harker LA, Rassekh CH. Episodic vertigo in basilar artery migraine. Otolaryngol Head Neck Surg 1987; 96: 239–250.
11. Hinchcliffe R. Headache and Meniere's disease. Acta Otolaryngol (Stockh) 1967; 63: 384–390.
12. Ishiyama A, Jacobson KM, Baloh RW. Migraine and benign positional vertigo. Ann Otol Rhinol Laryngol 2000; 109: 377–380.
13. Johnson G. Medical management of migraine-related dizziness and vertigo. Laryngoscope 1998; 108: 1–28.
14. Kayan A, Hood JD. Neuro-otological manifestations of migraine. Brain 1984; 107: 1123–1142.
15. Kuritzky A, Ziegler DK, Hassanein R. Vertigo, motion sickness and migraine. Headache 1981; 21: 227–231.
16. Lee H, Lopez I, Ishiyama A, Baloh RW. Can migraine damage the inner ear? Arch Neurol 2000; 57: 1631–1634.
17. Love Jr JT. Basilar artery migraine presenting as fluctuating hearing loss and vertigo. Otolaryngology 1978; 86: 450–458.
18. Neuhauser H, Leopold M, von Brevern M, Arnold G, Lempert T. The interrelations of migraine, vertigo, and migrainous vertigo. Neurology 2001; 56: 436–441.
19. Oh AK, Lee H, Jen JC, Corona S, Jacobson KM, Baloh RW. Familial benign recurrent vertigo. Am J Med Genet 2001; 100: 287–291.
20. Olesen J. Classification and diagnostic criteria for headache disorders, cranial neuralgias and facial pain. Cephalalgia 1988; 8(Suppl 7): 9–96.
21. Olsson JE. Neurotologic findings in basilar migraine. Laryngoscope 1991; 101: 1–41.
22. Rassekh CH, Harker LA. The prevalence of migraine in Meniere's disease. Laryngoscope 1992; 102: 135–138.
23. Savundra PA, Carroll JD, Davies RA, Luxon LM. Migraine-associated vertigo. Cephalalgia 1997; 17: 505–510.
24. Slater R. Benign recurrent vertigo. J Neurol Neurosurg Psychiatry 1979; 42: 363–367.
25. Toglia JU, Thomas D, Kuritzky A. Common migraine and vestibular funcition: electronystagmographic study and pathogenesis. Ann Otol Rhinol Laryngol 1981; 90: 267–271.
26. Viirre ES, Baloh RW. Migraine as a cause of sudden hearing loss. Headache 1995; 35: 24–28.
27. Waterston J. Chronic migrainous vertigo. J Clin Neurosci 1998; 5: 496.
28. Whitney SL, Wrisley DM, Brown KE, Furman JM. Physical therapy for migraine-related vestibulopathy and vestibular dysfunction with history of migraine. Laryngoscope 2000; 110: 1528–1534.