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Original Article

Migraine Equivalents as Part of Migraine Syndrome in Childhood

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ABSTRACT

BACKGROUND: Migraine equivalents are common clinical conditions without a headache component, occurring as repeated episodes with complete remission between episodes. They include abdominal migraine, cyclical vomiting, benign paroxysmal vertigo, and benign paroxysmal torticollis. Other clinical entities, such as motion sickness and limb pain have been associated with migraine. We aimed to investigate the prevalence of migraine equivalents in a large population of children referred to a pediatric headache center and to analyze the possible relationship between migraine equivalents and headache features. **METHODS:** A total of 1134 of children/adolescents (73.2% with migraine and 26.8% with tension-type headache) were included. Patients were divided into two groups according to the episode frequency (high and low). Pain intensity was rated on a three-level graduate scale (mild, moderate, and severe pain). **RESULTS:** Migraine equivalents were reported in 70.3% of patients. Abdominal migraine (48.9%), limb pain (43.9%), and motion sickness (40.5%) were the most common migraine equivalents. Although headache type (migraine or tension-type headache) did not correlate with migraine equivalents presence ($\chi^2 = 33.2$; $P = 0.27$), high frequency of headache episodes correlated with the occurrence of migraine equivalents. Moreover, migraine equivalents indicated a protective role for some accompanying feature of the headache episode. **CONCLUSIONS:** Our results suggest that migraine equivalents should not be considered merely as headache precursors, but they as part of the migrainous syndrome. Thus, their inclusion among the diagnostic criteria for pediatric migraine/tension-type headache is useful.

Keywords: migraine equivalents, childhood periodic syndromes, abdominal migraine, limb pain, motion sickness, childhood headache

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Introduction

Migraine equivalents of infancy, childhood, and adolescence are common clinical conditions, often occurring without a headache component, occurring as repeated episodes with complete remission between episodes.^{1–5} They may precede the development of migraine headache by

several years and indicate a later evolution to more typical migraines.^{4–9} It has been observed that these disturbances have a relatively constant sequence in individual patients, and the appearance of some signs frequently coincides with the disappearance or reduced severity of another.^{3,6–8,10} On the other hand, signs like abdominal pain, which tend to start in the middle childhood age, often coexist with headache.^{11–13}

The International Classification of Headache Disorders, third edition (ICHD-III)¹ included four migraine equivalents, defined as “Episodic syndromes which may be associated with migraine”. These are “cyclical vomiting syndrome” (1.6.1.1), “abdominal migraine” (1.6.1.2), “benign paroxysmal vertigo” (1.6.2), and “benign paroxysmal torticollis” (1.6.3).

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Beyond the signs described by ICHD-III, other clinical entities are not universally accepted. In particular, although many studies focused on the relationship between childhood headache and gastrointestinal disorders (cyclical vomiting and abdominal pain),^{6,7,12,14–19} less attention has been paid to motion sickness^{7,17,20} and limb pain (sometimes referred to as “growing pain”).^{8,17,21,22}

Several elements support the hypothesis that the association between migraine and migraine equivalents is not a pure coincidence: (1) both conditions have periodic and paroxysmal nature^{2,10,23}; (2) accompanying signs, such as gastrointestinal, neurological, and vasomotor abnormalities, including nausea, vomiting, photophobia, phonophobia, and pallor, can be present in migraine episodes and can be associated with migraine equivalents^{1,2,4,5,9}; (3) a strong familial genetic background is shared by migraine and equivalents^{4,12,14,21,24,25}; (4) precipitating and relieving factors, including physical stress or psychologic triggering factors, are often common to both disturbances^{4,12,14,21,22}; (5) the same neurophysiologic abnormalities can be found in migraine equivalents and migraine^{26,27}; (6) migraine prophylactic treatment can be effective also in migraine equivalents^{4,9,14,28}; and (9) *CACNA1A* gene mutations have been associated with hemiplegic migraine in individuals with paroxysmal torticollis.^{2,4,29,30} In spite of this, the question of whether migraine equivalents are only precursor signs preceding the migrainous disease or are they integral part of the migraine syndrome in childhood is still unanswered. If the second were true, there should be a correlation between migraine equivalents and some clinical features of migraine (such as frequency/intensity of the episodes and presence of the accompanying signs). Furthermore, migraine equivalents are usually categorized as migraine subtypes, assuming that no link exists with other pediatric primary headache. There is a growing body of literature suggesting that in developing age migraine and tension-type headache represent two expressions of the same disease, differing only for symptom severity.^{31–34} According to this hypothesis, both migraine and tension-type headache children should have the same migraine equivalents prevalence rate.

In this retrospective study, our aims were 1) to investigate whether migraine equivalents are related with headache features and 2) to calculate the migraine equivalents prevalence in both migraineurs and tension-type headache children.

Materials and Methods

Selection and classification of the patients

Patients were identified through a systematic review of clinical records of patients referred to our headache center from June 2007 to April 2011.

Data on the clinical characteristics of headache were evaluated by detailed interview and complete physical and neurological examination in the context of the first consultation. Secondary headaches, cluster headache, or patients suffering from any other neurological or internal disease were excluded from our study. The final diagnoses of headache were made according to ICHD-III.¹ However, to evaluate the possible correlation between migraine equivalents and the frequency of pain, we arbitrarily classified the frequency of episodes as high (from weekly to daily episodes) and low (from less than once a month to three episodes per month). The arbitrary cut point was chosen for three reasons as follows: 1) compared with patients with episodic headache attacks, patients who could be included in the chronic headache (migraine or tension-type headache) diagnoses were too few to undergo reliable

statistical comparison; 2) a mere distinction between chronic and episodic patients would have led to include individuals with high, but not chronic, headache episode frequency, for example, 14 episodes per month, in the same group of patients with very low frequency of episodes, for example, 1 episode per month; and 3) the chosen cut point had the rationale to distinguish patients who need prophylactic treatment from those who do not. We also classified pain rating on a graduate scale at three levels of severity: 1) mild pain, allowing the patient to continue his/her daily activities; 2) moderate pain, leading to interruption of patient activities; and 3) severe pain, forcing the child to go to bed. For each patient, we analyzed the presence of headache-associated signs, such as nausea, vomiting, photophobia, and phonophobia.

The migraine equivalents investigation was performed by an interview during the initial assessment of the child. The interview was designed to provide sufficient information concerning the characteristics of the abnormalities to allow them to be classified as migraine equivalents or otherwise. Possible organic causes of the signs, for example, other neurological diseases for benign paroxysmal vertigo or gastroenterological abnormalities for abdominal migraine and cyclical vomiting, were investigated, and their occurrence led to patient exclusion. Diagnosis was based on the presence of the typical clinical features of the migraine equivalents included in the ICHD-III (cyclical vomiting, abdominal migraine, benign paroxysmal vertigo, and benign paroxysmal torticollis). Although limb pain and motion sickness are not classified in the ICHD-III, they were considered in our children after having excluded other disorders, for example, rheumatic disease for limb pain. In particular, the diagnosis of limb pain was based on the following criteria: 1) pain is usually nonarticular, located in the lower extremities and is usually bilateral; 2) pain appears late in the day or is nocturnal, often awaking the child; 3) parents often report pain on days of increased physical activity; 4) duration ranges from minutes to hours, and the intensity can be mild or very severe; 5) there are no objective signs of inflammation on physical examination; and 6) limb pains are episodic, with pain free intervals from days to months.³⁵ The diagnosis of motion sickness was made in children experiencing discomfort when perceived motion disturbs the organs of balance; they could indicate nausea, vomiting, pallor, cold sweats, hypersalivation, hyperventilation, and headaches.³⁶ Both patients who had complained of migraine equivalents only in the past and those who continued to suffer from one or more migraine equivalents were included.

Statistical analysis

Statistical analysis was performed using MYSTAT (Systat, San Jose, CA) software. Demographic characteristics of patients and characteristics of headache were compared among groups presenting or not migraine equivalents by using the Pearson chi-square test. A dummy variable for frequency was constructed as described previously. Depending on variables, binomial and multinomial logistic regressions were performed, and odds ratio estimates were calculated. A $P < 0.05$ was considered statistically significant.

Results

Patients

A total of 1134 of children/adolescents were included in our study. The sample was composed of 52.3% boys and 47.7% girls (mean age \pm standard deviation, 9.8 ± 3.0). A total of 73.2% of patients were diagnosed as migraineurs. The overall prevalence of migraine without aura (1.1) was 60.1%, whereas 6.2% of all patients suffered from migraine with aura (1.2), and 6.9% had chronic migraine (1.3). Infrequent tension-type headache (2.1) and frequent tension-type headache (2.2) occurred in 5.4% and 17.3% of the patients, respectively, whereas 4.1% of the sample received a diagnosis of chronic tension-type headache (2.3) (Table 1).

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