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What Incites New Daily Persistent Headache in Children?

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This study asked what incites the development of a new daily persistent headache in children. A total of 175 children with chronic daily headache were prospectively identified and observed by the author. Of these patients, 40 (23%) with a new daily persistent headache were identified. These patients had no significant prior headache history. Seventeen patients (43%) had the onset of their symptoms during an infection. Of these patients, over half had positive Epstein-Barr virus serology at the onset of symptoms. Nine patients (23%) manifested minor head injuries at the onset of their symptoms, yet had a normal examination and neuroimaging. Symptom onset was also associated with surgery (four patients) and high-altitude camping (one patient). In five patients, no specific etiologic factor could be identified. Four patients were initially identified as having idiopathic intracranial hypertension, yet their chronic headache persisted despite the normalization of their intracranial pressure. Similar findings were observed in episodic migraine patients who abruptly developed the onset of chronic migraine. In conclusion, the onset of new daily persistent headache in childhood is typically associated with a physiologic stress such as an infection, head trauma, or post-surgery.

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Introduction

Chronic daily headache is a disorder in which the diagnosis is based on the presence of headache for at least 15 days in a 1-month period over a period of three consecutive months and with no underlying organic pathology [1,2]. Chronic daily headache has been demonstrated to represent nearly 30% of the patients observed in headache specialty clinics [3]. The prevalence of chronic daily headache in the general population is approximately 4%, but determining its incidence and prevalence in pediatric patients has been more difficult to define [4,5]. Silberstein et al. have defined four different categories of chronic daily headache on the basis of symptoms, which include: transformed or chronic migraine, chronic tension-type headache, new daily persistent headache, and hemicrania continua [6].

New daily persistent headache was first described in 1986 [7]. The defining characteristic of a new daily persistent headache is a daily, unremitting headache from the onset of the headache. The pain is typically bilateral, pressing or tightening, and of mild to moderate intensity [8]. This condition occurs in a patient with no significant prior headache history.

In studies looking primarily at adult patients, the frequency of new daily persistent headache was estimated to be 1.7% to 10.8% of patients with chronic daily headache. Adult new daily persistent headache patients are predominantly female [9-11]. Previous studies in children have found the new daily persistent headache to be diagnosed in 13% to 35% of children with chronic daily headache [12,13]. The pathophysiology of new daily persistent headache is unknown. Li and Rozen [14] identified viral infections, extracranial surgery, and stressful life events as triggers for the new onset headache primarily in adult patients. However, up to 40% of their patients had no known trigger.

This study tests the hypothesis that new daily persistent headaches in children are precipitated by a physiologic stress. The study seeks to define the frequency of new daily persistent headache in a group of children with chronic daily headache, and delineates the specific precipitants that incite the new daily persistent headache in children.

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Table 1. New daily persistent headache is a frequent diagnosis in children with chronic daily headache

Chronic Daily Headache Subtype	Females (*n*)	Males (*n*)	Total Patients (*n*)	Total Patients % Total	Female: Male Ratio
Chronic migraine	69	25	94	54%	2.8
New daily persistent headache	27	13	40	23%	2.1
Chronic tension type headache	27	8	35	20%	3.4
Hemicrania continua	4	2	6	3%	2.0
Total	127	48	175	100%	2.6

Although chronic migraine was the most common form of chronic daily headache, new daily persistent headache occurred in 23% of the chronic daily headache patients. Females outnumber males in all categories.

Methods

Patients with chronic daily headache were prospectively identified in the author's headache clinic at the Mayo Clinic between 2001 and 2003. All patients were 18 years of age or younger. Patients were included in this study based on the presence of headache on 15 or more days per month for at least 3 months. Patients were classified by subtypes of chronic daily headache [6]. Patients with new daily persistent headache were specifically defined by the lack of a prior history of severe intermittent headaches, and having an abrupt onset of a daily headache. Patients with hemicrania continua or chronic cluster were not included in the new daily persistent headache group. Patients with a previous history of migraine or episodic tension-type headache, but a new abrupt onset of the daily headache, were also not included in the new daily persistent headache group.

A total of 186 potential patients were identified; 175 patients had given permission to have their data included in a research study. Data were obtained by review of the patients' neurologic record. This study was reviewed and approved by the Mayo Institutional Review Board.

Results

Children with chronic headache frequently present with an abrupt onset to their chronic headache. Of the 175 children identified with chronic daily headache, 40 (23%) of the children were classified as having a new daily persistent headache. The most common subtype of chronic daily headache observed was chronic migraine (Table 1). However, even in chronic migraine patients, the transformation from an episodic migraine to a chronic migraine was abrupt 30% of the time (Table 2). A female predominance was observed in all chronic daily headache subtypes.

The onset of new daily persistent headache is temporally associated with infection or other physiologic stressor. At the time of new daily persistent headache onset, 43% of patients reported a febrile illness (Table 3). Over half of these patients had serology to document an Epstein-Barr virus infection associated with the new daily persistent headache onset. Minor head trauma, cranial or extracranial surgery, or high-altitude climbing were also temporally related to the onset of the headaches in some patients. Ten percent of patients were initially diagnosed as having idiopathic intracranial hypertension. However, after resolution of the elevated cerebrospinal fluid pres-

Table 2. Are similar inciting factors present in the transformation of chronic migraine?

	Females (*n*)	Males (*n*)	Total *n*	Total % Total
Gradual vs abrupt onset of chronic migraine				
Gradual onset of chronic migraine	52	14	66	70%
Abrupt onset of chronic migraine	17	11	28	30%
Total	69	25	94	100%
Precipitants in patients with abrupt onset of chronic migraine				
Illness–Total	6	7	13	46%
Illness–Epstein-Barr virus	1	3	4	14%
Minor head trauma	5		5	18%
Idiopathic intracranial hypertension	1		1	4%
Surgery		1	1	4%
Hormonal therapy	1		1	4%
None	4	3	7	25%
Total	17	11	28	100%

Of 94 patients with chronic migraine, 30% reported an abrupt transition from episodic to chronic migraine. In these patients, febrile illness and minor head trauma were frequently associated with the onset of chronic migraine. Twenty-five percent of patients could not identify a specific factor at the time of the transformation from episodic to chronic migraine.

Table 3. New daily persistent headache is precipitated by infection or other physiologic stressors

Inciting Factor	Females (*n*)	Males (*n*)	Total (*n*)	Total % Total
Illness–Total	10	7	17	43%
Illness, Epstein-Barr virus only	8	1	9	23%
Minor head trauma	7	2	9	23%
Idiopathic intracranial hypertension	2	2	4	10%
Surgery	3	1	4	10%
High-altitude climbing	0	1	1	2%
None	5	0	5	12%
Total	27	13	40	100%

At the time of new daily persistent headache onset, 43% of patients reported a febrile illness. Epstein-Barr virus was a commonly identified infection associated with the new daily persistent headache onset. Minor head trauma, cranial or extracranial surgery, or high-altitude climbing were also temporally related to the onset of the headaches in some patients.

sure, these patients continued to have a chronic daily headache. No inciting factor could be identified in 12% of the patients.

Are similar factors associated with the development of chronic migraine? Fifty-four percent of the 175 chronic daily headache patients could be best described as having chronic migraine. Of these 94 patients, 30% reported an abrupt transition from episodic to chronic migraine (Table 2). In these patients, febrile illness and minor head trauma were frequently associated with the abrupt onset of chronic migraine. Twenty-five percent of patients could not identify a specific factor at the time of the transformation from episodic to chronic migraine.

Discussion

This study asked what factors are associated with the onset of a new daily persistent headache in children. It demonstrated that new daily persistent headache occurred in 23% of the patients with chronic daily headache. Factors associated with the onset of new daily persistent headache included febrile illness, minor head trauma, idiopathic intracranial hypertension, and surgery. Approximately 30% of the patients with chronic migraine experienced an abrupt onset to their chronic headache. In these patients with abrupt onset of chronic migraine, similar precipitating factors such as febrile illness and minor head trauma were also identified.

The exact pathophysiology of how these events result in a new daily persistent headache is unknown. Even in this group of patients, the temporal relationship of a seroconversion on viral titers, or head trauma to the onset of the headache is often impressive and striking, but certainly that close temporal relationship does not prove causation. Indeed, these factors may not "cause" the headache, but rather they may incite an underlying predisposition to headaches.

In addition to the risk factors mentioned above, the transformation of an episodic headache into a chronic headache (or the onset of new daily persistent headache) in adults has also been associated with hypothyroidism, hypertension, consumption of alcohol more than three times per week, analgesic overuse, daily consumption of caffeine [15], multiple types of infections [16], and stressful life events [17]. This author speculates that these physiologic stressors result in the initiation of the headache in a predisposed individual. An unanswered question, however, is why is there such a persistence of the headache, even after the inciting factor has resolved? This phenomenon may relate to as yet unidentified host factors. Even with the identification of these risk factors, treatment remains a challenge.

New daily persistent headache is likely a more frequent diagnosis in children than in adults. For instance, in a study of 651 consecutive patients aged 17 and older, only 11 patients (1.7%) were defined as having new daily persistent headache [10]. Other studies in children have found new daily persistent headache to occur more frequently, with a frequency of 13% to 35% [12,13]. In a study of 56 patients with new daily persistent headache, Li and Rozen [14] observed that the peak age of onset was in the second and third decade in women, and the fifth decade in men.

In the present study, the largest subset of chronic daily headache patients had chronic migraine. Seventy percent of chronic migraine patients reported a gradual onset of their headache over a course of weeks to months. However, 30% of chronic migraine patients reported an abrupt onset to their daily headache. Factors such as illness or minor head trauma were often associated with the abrupt onset, similar to what was observed in new daily persistent headache patients.

In conclusion, pediatric patients with or without a previous headache history can abruptly transform into a chronic daily headache syndrome. Treating physicians should be aware of the multiple factors that are associated with this transition and offer appropriate counseling to their patients.

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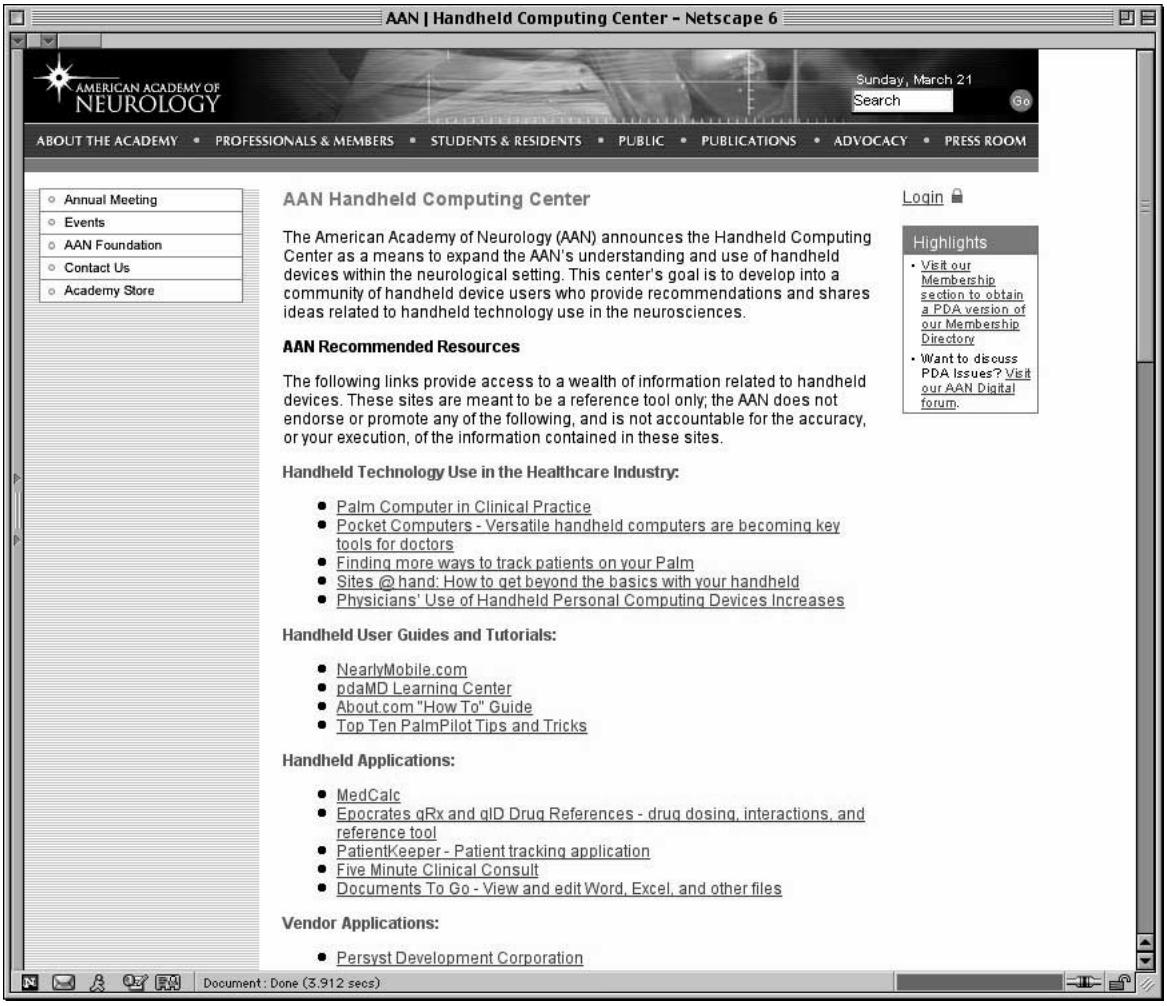

AAN Handheld Computing Center—Web Update
Provided by Kenneth Mack, MD, PhD, and Steven Leber, MD, PhD

The American Academy of Neurology (AAN) has developed the Handheld Computing Center (*http://aan.com/pda.cfm*) as a means to expand the neurologist's understanding and use of handheld devices. The center's goal is to develop a community of handheld device users who provide recommendations and shares ideas related to handheld technology use in the neurosciences. Included on this site are links to a wealth of information related to handheld devices.