Official Journal of the European Paediatric Neurology Society

Original article

Childhood headaches and brain magnetic resonance imaging findings

Ünsal Yılmaz [a,*], Mehmet Çeleğen [b], Tuba Sevim Yılmaz [c], Müge Gürçınar [d], Aycan Ünalp [a]

[a] Department of Pediatric Neurology, Dr. Behçet Uz Children's Hospital, Izmir, Turkey
[b] Department of Pediatrics, Dr. Behçet Uz Children's Hospital, Izmir, Turkey
[c] Department of Public Health, Dokuz Eylul University Hospital, Izmir, Turkey
[d] Department of Radiology, Alsancak MRI Center, Izmir, Turkey

ARTICLE INFO

Article history:
Received 24 August 2013
Received in revised form
15 October 2013
Accepted 1 November 2013

Keywords:
Headache
Magnetic resonance imaging
Children
Migraine
Tension-type

ABSTRACT

Background: Headaches are common in children and brain magnetic resonance imaging (MRI) studies are widely used in everyday clinical practice because of increasing demands by parents.
Aim: To determine headache types and to evaluate the frequency and clinical significance of brain MRI abnormalities in children with headache.
Methods: A total of 449 children (261 male and 188 female with a mean age of 11.16 ± 3.22 years) with headache were included into the study. The criteria defined by International Headache Society were used to classify the headache types.
Results: The causes of headache were migraine in 247 (55.0%), tension-type in 133 (29.6%), secondary in 48 (10.7%), and unspecified headaches in 21 (4.7%) patients. Overall, 324 (72.2%) patients underwent cerebral MRI, which revealed abnormalities in 68 (21.0%) patients. Two (0.6%) patients had cerebral MRI abnormalities relevant to headache, including tumor and hydrocephalus each 1 (0.3%). Twenty-nine (8.9%) patients had incidental cerebral MRI abnormalities including 14 (4.3%) white-matter hyperintensities, 4 (1.2%) old infarcts, 3 (0.9%) Chiari malformations, arachnoid cysts and demyelinating lesions each 2 (0.6%), and subdural hygroma, fibrous dysplasia, pineal cyst and perivascular widening, each 1 (0.3%). Remaining 36 (11.1%) patients had extra-cerebral MRI abnormalities including 34 (10.5%) sinus disease, and 2 (0.6%) adenoid vegetation. Indications for brain MRI were atypical headache pattern or presence of neurologic abnormalities in 59 (18.2%) patients and parents' concerns in 265 (81.8%) patients. The rates of abnormal MRI findings were similar between these 2 groups.
Conclusions: The most frequent cause of headache in children is migraine. Despite the high rate of imaging abnormalities, the yield of brain MRI is not contributory to the diagnostic and therapeutic approach.

* *Corresponding author*. Department of Pediatric Neurology, Dr. Behçet Uz Children's Hospital, Konak, 35210 Izmir, Turkey. Tel.: +90 532 7163537; fax: +90 0 232 4892315.
E-mail address: drunsalyilmaz@yahoo.com (Ü. Yılmaz).
1090-3798/$ – see front matter © 2013 European Paediatric Neurology Society. Published by Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.ejpn.2013.11.003

1. Introduction

Headache is a common and generally a benign disorder in children. Reported prevalence rates of headache during childhood range from 25% to 93%.[1–4] Although the majority of headaches are attributable to benign conditions such as migraine and tension-type headache, parents and physicians are often concerned about serious underlying diseases such as a brain tumor. However, the yield of neuroimaging in headaches for underlying pathologies in children with a normal neurological examination is low.[5,6] Moreover an intracerebral tumor is rarely presented solely with headache.[7] A practice parameter regarding imaging of children with headache was released by the Quality Standards Subcommittee of the American Academy of Neurology and the Practice Committee of the Child Neurology Society in 2002. According to these recommendations, neuroimaging on a routine basis is not indicated in children with recurrent headaches and a normal neurologic examination.[8] Nevertheless, in daily clinical practice, MRI is widely used during the initial assessment of children with headaches, because of increasing parental demands and fear of missing serious underlying diseases. However, when an incidental brain abnormality unrelated to headache is detected, the patients and their parents may become more confused and stressful instead of being relieved.

Indeed, between 19 and 36% of patients presented with headache were found to have incidental brain MRI findings.[9,10] When modern acquisition techniques used, this rate increased up to 52% in children with headache.[11] Moreover, incidental brain abnormalities were reported in 21% of 225 healthy children.[12] In pediatric neurology practice, 25% of patients were found to have incidental cerebral MRI abnormalities.[13] However only 1.2% of patients imaged for headache had cerebral MRI abnormalities that require a change in management.[10]

Since limited data are available in children, the present study aimed to determine the types of headache and to document the frequency and the clinical significance of brain MRI abnormalities in children referred to pediatric neurology clinic due to a main symptom of headache.

2. Materials and methods

Children attending one of the pediatric neurology outpatient clinics at Dr. Behçet Uz Children's Hospital between July 2011 and April 2013, with headache as the main presenting symptom with sufficient severity to be referred to a pediatric neurology clinic for additional evaluation were included into the study. Patients with acute headache and a known intracranial lesion were excluded. All children were referred to the clinic by pediatricians, and they were assessed by a single child neurologist who used a standardized approach for patients with headache, and preferred MRI as the neuroimaging modality when required. Thus this is rather an experience of a single child neurologist, instead of the experience of multiple providers in the institution. The study was approved by the local ethic committee of the Hospital.

A detailed history was taken and a complete systematic physical examination, including arterial blood pressure measurement, a detailed neurological examination, and a complete ophthalmologic examination were performed in all children. All data were recorded into structured files by the assessing child neurologist at each visit. Data including age at onset of the headache and age at presentation, sex, duration of illness, frequency of headache attacks, type of headache, and brain MRI findings were retrieved from these files. Abnormal neurological signs and symptoms including papilledema, motor deficits, sensory symptoms such as paresthesias and cerebellar symptoms were noted.

The neuroimaging studies were performed based on the recommendations of the Quality Standards Subcommittee of the American Academy of Neurology and the Practice Committee of the Child Neurology Society,[8] which include recent onset of severe headache, a change in the pattern of headaches, abnormal neurologic examination including focal findings, signs of increased intracranial pressure, significant alteration of consciousness, and coexistence of seizures. In addition, neuroimaging was also performed if demanded insistently by patients and/or parents because of a concern of an underlying serious brain disorder, mostly a tumor, after the physician has reassured the patients and/or their parents that the condition was benign and needed no for further investigations including blood tests and neuroimaging.

Patients were routinely reviewed at first month following the initial assessment, every three months subsequently, and when clinically necessary such as when the character, severity or frequency of headache changed or when other neurologic symptoms developed. Only patients with at least 6 months follow up period included into the analysis.

Headaches were classified according to the second edition of the International Headache Society (IHS) classification.[14,15] According to this classification, all headaches are mainly divided into primary and secondary headaches. The diagnosis of a primary headache requires the exclusion of a secondary headache disorder. The primary headaches then further divided into four categories: migraine, tension-type headache (TTH), cluster headache and other trigeminal autonomic cephalalgias, and other primary headaches. There are also eight categories of secondary headache, one category for cranial neuralgias and a fourteenth category for headache not classifiable elsewhere. The criteria for primary headaches are clinical-descriptive and, with a few exceptions (e.g., familial hemiplegic migraine), based on headache features, not etiology. In clinical practice, patients should receive a diagnosis for each headache type they have experienced within the past year, and the same patient might have different diagnosis. These cases are accepted to have more than one diagnosis. In the present study however, patients who had both primary and secondary headaches were accepted to have secondary headache. For headache types that are missing a single diagnostic feature and do not fulfill the full criteria for another headache, provision is made for probable diagnoses, such as probable migraine. The patients with probable diagnosis were also included in the definite diagnosis groups. The diagnosis of secondary headache was made in children who experienced a new kind of headache for the first time in close temporal relation to another disorder known to cause headache and the headache was attributed to that disorder such as brain tumors or sinusitis. The diagnosis of sinusitis was made after evaluation of the patients by an otolaryngologist. In a patient