

## Abdominal migraines: Variations in diagnosis and care between pediatric gastroenterologists and neurologists

### Migraña abdominal: Variaciones en el diagnóstico y tratamiento entre gastroenterólogos y neurólogos pediatras

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Received: 27-5-2019; Approved: 28-9-2019

#### What do we know about the subject matter of this study?

Abdominal migraine is a rare disorder in pediatrics characterized by episodes of severe intermittent abdominal pain, sometimes managed by pediatric gastroenterologists or pediatric neurologists, who have different diagnostic criteria. Gastroenterologists follow the Rome IV criteria and neurologists the International Headache Society ones. There is little evidence regarding the treatment and management of abdominal migraines and there are no published studies on differences in management between pediatric gastroenterologists and neurologists.

#### What does this study contribute to what is already known?

There are differences in diagnosis and treatment between pediatric gastroenterologists and neurologists. The abdominal migraine diagnosis in some patients seen by neurologists is made even without recorded abdominal pain. Few specialists record the diagnosis based on the criteria of their respective societies.

#### Abstract

**Introduction:** Abdominal migraine (AM) is uncommon and understudied. Our objective was to investigate the diagnosis and treatment of children and adolescents with AM and compare with that of pediatric gastroenterologists and neurologists. **Patients and Method:** All AM cases (1-18 years) from a USA hospital with diagnosis of abdominal migraine or its variants (ICD-9 346.2 or IC-10 G43.D, G43.D0, G43.D1) between 2011 and 2017 were reviewed. Information on diagnosis, interval from onset of symptoms, diagnostic criteria, diagnostic tests, treatment, and outcome were analyzed. **Results:** 69 medical records were identified. The mean age at diagnosis was 9.7 years, and 48% of patients were female. 50/69 (72.4%) patients were exclusively treated by a pediatric gastroenterologist and 10/69 (14.5%) exclusively by a pediatric neurologist. 6/69 (8.7%) were initially evaluated by gastroenterology and referred to neurology, and 2/69 (2.9%) were initially evaluated by neurology and then referred to gastroenterology. 3/10 (30%) of the AM diagnosed by neurologists did not report abdominal pain (AP), however, all diagnoses made by gastroenterologists did ( $p = 0.0035$ ). 5/50 (10%) of the gastroenterology medical records and no neurology medical records mentioned Rome criteria. **Conclusions:** Most of the children were diagnosed by pediatric gastroenterologists. Gastroenterologists rarely use the Rome criteria. Patients evaluated by neurologists are frequently diagnosed with AM even without AP (a criterion that is required for its diagnosis). Education is recommended for the correct and timely diagnosis of AM.

#### Keywords:

Abdominal migraine;  
migraine;  
functional  
gastrointestinal  
disorders;  
abdominal pain

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How to cite this article: Rev Chil Pediatr. 2020;91(1):46-50. DOI: 10.32641/rchped.v91i1.1250

## Introduction

Abdominal migraine is a rare but highly tasking functional abdominal pain disorder that is exclusively diagnosed in children<sup>1-3</sup>. Abdominal migraine is defined by the Rome IV criteria as stereotypical episodes of severe and incapacitating abdominal pain separated by weeks to months of little to no symptoms<sup>3</sup>. According to the Rome IV criteria, abdominal pain episodes should be associated with additional co-morbid symptoms such as photophobia, pallor, anorexia, nausea, vomiting or headaches (table 1)<sup>3</sup>. Abdominal migraine can also be defined by the International Classification of Headache Disorders (ICHD-3) which requires the presence of abdominal pain associated with vasomotor symptoms (table 2)<sup>4</sup>. The latter criteria is more commonly used by neurologists<sup>4</sup>. This is relevant as patients with a presumptive diagnosis of abdominal migraine are not always diagnosed and cared for by pediatric gastroenterologists. There is a dearth of data on the standard of care of abdominal migraine, no information on variations of care between pediatric gastroenterologists and neurologists and only one small pharmacologic clinical trial (14 patients) has ever been published. The trial assessed the efficacy of a drug that is not available in the United States (pizotifen)<sup>5</sup>.

In view of the paucity of data of this uncommon disorder, it is of utmost importance to better understand the diagnostic criteria and management plans currently used to care for this group of children. Therefore, our objectives were to investigate current practices in the care of children and adolescents with abdominal migraine in a major Midwest (USA) tertiary care hospital. Children with abdominal migraine will be diagnosed and cared for either by pediatric neurologists or pediatric gastroenterologists with each specialist following their own societal diagnostic criteria. As there is no standard of care for abdominal migraines, our objective was to assess for and establish any differences between diagnosis and management between pediatric neurologists and pediatric gastroenterologists.

## Patients and Method

Data of all pediatric patients 1-18 years old from Nationwide Children's Hospital of Columbus, OH, diagnosed with abdominal migraine or its variants (ICD-9 346.2 or IC-10 G43.D, G43.D0, G43.D1) between 2011-2017 were extracted from the database and their charts were reviewed. Information on diagnosis (such as age at diagnosis), interval from onset of symptoms, whether they met diagnostic criteria, diagnostic testing, treatment and outcome were extracted and analyzed between the two specialties. This data was

then analyzed statistically using the 2-sample t-test. There were no exclusion criteria as we wanted our sample size to be as large as possible. If they had an aforementioned code after an office visit, they were included. A protocol for this study was written and submitted to the IRB (17-00369) and then was approved.

## Results

Sixty-nine charts with the diagnosis of abdominal migraine were identified and the physician's diagnosis was confirmed by chart review. Mean age at the time of diagnosis was 9.7 years, 48% females. Mean initial follow up visit was 3.2 months, range 11.5 months. 42/69 (61%) of patients had symptoms for 1 year or longer before diagnosis established. Total of 45 patients were found to have follow up within 12 months. 50/69 (72.4%) were cared by pediatric gastroenterologist alone

**Table 1. Rome IV diagnostic criteria for abdominal migraines<sup>3</sup>**

Must include all of the following occurring at least twice and fulfilled for at least 6 months before diagnosis:

- 1) Paroxysmal episodes of intense, acute periumbilical, midline or diffuse abdominal pain lasting 1 hour or so (should be the most severe and distressing symptom).
- 2) Episodes are separated by weeks to months.
- 3) The pain is incapacitating and interferes with normal activities.
- 4) Stereotypical pattern and symptoms in the individual patient.
- 5) The pain is associated with 2 of more of the following:
  - a) Anorexia
  - b) Nausea
  - c) Vomiting
  - d) Headache
  - e) Photophobia
  - f) Pallor
- 6) After appropriate evaluation, the symptoms cannot be fully explained by another medical condition

**Table 2. ICHD-3 diagnostic criteria for abdominal migraines<sup>4</sup>**

- A. At least five attacks of abdominal pain, fulfilling criteria B-D
- B. Pain has at least two of the following three characteristics:
  1. Midline location, periumbilical or poorly localized
  2. Dull or "just sore" quality
  3. Moderate or severe intensity
- C. During attacks, at least two of the following:
  1. Anorexia
  2. Nausea
  3. Vomiting
  4. Pallor
- D. Attacks last 2-72 hr when untreated or unsuccessfully treated
- C. Complete freedom from symptoms between attacks
- D. Not attributed to another disorder

ne and 10/69 cases (14.5%) were exclusively cared by pediatric neurology. 6/69 (8.7%) were initially seen by pediatric gastroenterologist but later referred to neurology for diagnosis. 2/69 (2.9%) were initially seen by neurology but then referred to pediatric gastroenterologist for diagnosis. 1/69 (1.5%) was diagnosed and cared for by the pediatrician. Children who were diagnosed by pediatric neurologist were younger than those diagnosed by pediatric gastroenterologist ( $p = 0.0038$ , CI -3.14 to -0.63).

### Diagnosis

Although abdominal pain is the driving symptom of abdominal migraine and is required by the ICDH-3 for its diagnosis, 3/10 (30%) of children diagnosed by neurology did not have abdominal pain while all children diagnosed by pediatric gastroenterologist did ( $p = 0.0035$ ). 16/50 (32%) of children diagnosed with abdominal migraine by pediatric gastroenterologist and 3/10 (30%) of children diagnosed by pediatric neurologist met Rome III/IV criteria (current criteria at time of diagnosis) ( $p = 1.0$ ). We cannot conclusively state that some patients did not meet criteria, but providers did not write it in the chart or thoroughly describe their symptoms. 34/50 (68%) of children diagnosed with abdominal migraine by pediatric gastroenterologist either did not meet Rome criteria (25/50 (50%)) or had incomplete information on all criteria listed in the Rome III/IV criteria (9/50 (18%)). Thus, no conclusion on whether those children met criteria could be determined. 1/1 (100%) diagnosed by a pediatrician did not meet Rome criteria. Gastroenterologists referred to the Rome criteria in 5/50 (10%) of charts, whereas there was no mention to the Rome criteria or the International Classification of Headache Disorders in any neurology charts. Of the patients diagnosed by a pediatric neurologist, 6/16 (37.5%) met the ICHD-3 criteria. 10/16 (62.5%) of children diagnosed with abdominal migraine by a pediatric neurologist either did not meet ICHD-3 criteria (8/10 (80%)) or had incomplete information on all criteria listed in the ICHD-3 criteria (2/10 (20%)).

### Laboratory workup

Gastroenterologists frequently conducted laboratory workup at the time of diagnosis (85%), while none of the patients diagnosed by neurology or general pediatrician underwent diagnostic workup. Following the diagnosis, a subset of patients in both groups had additional workup that included celiac testing, inflammatory markers, complete blood count/chemistries in 35/53 (66%) of patients managed by gastroenterologists and 5/16 (31%) of patients managed by pediatric neurologists ( $p = 0$ ). 6/69 patients received head imaging (4 patients with MRI head, 2 patients received CT

head, all negative for acute findings). In no cases did the laboratory workup result in diagnosis changes.

### Treatment

Every patient diagnosed with abdominal migraine received treatment. Excluding medications given in the emergency room, neurologists prescribed either cyproheptadine (56%) or sumatriptan (44%) for the treatment of their patients, while gastroenterologists prescribed a wider range of drugs. These included cyproheptadine (50%), sumatriptan (31%), promethazine (31%), amitriptyline (22%), hyoscyamine (18%), ondansetron (17%) and dicyclomine (6%). Treatment prescribed by neurology did not differ between those who did or did not have abdominal pain.

### Follow-up

6/16 (37.5%) of neurology patients and 16/52 (30.8%) of patients cared by gastroenterology have not had follow up appointments. Out of those who had follow-up by neurologist, 7/16 (44%) of patients treated by neurology evaluated for improvements in headaches and 3/16 (19%) found to have improved abdominal pain (63% total with improved symptoms). 33/36 (92%) of children treated by gastroenterologists reported improved abdominal pain. One patient seen by neurology had spontaneous resolution of all previous symptoms including abdominal pain and headache and 4 (8%) patients cared by gastroenterology resolved their symptoms with medications.

### Discussion

We found that most children with abdominal migraine are cared for by pediatric gastroenterologists. Contrary to our hypothesis, pediatric neurologists and gastroenterologists do not follow their own societal diagnostic guidelines. Both established criteria, the Rome and International Classification of Headache Disorders, require abdominal pain for its diagnosis. The diagnosis of abdominal migraine is also made in the absence of abdominal pain by non-gastroenterologists. This is of interest as the presence of severe and debilitating abdominal pain is the driving symptom in diagnosis of abdominal migraine. Our study also indicated that neurologists focused more on headache in their follow up evaluation as the primary symptom with either vomiting and/or abdominal pain as an adjunct symptom.

Not using the diagnostic criteria previously established is problematic for clinical care and research. In terms of patient's care, it precludes accurate communication among practitioners at the time of referrals as well as transition of care into adulthood. In

terms of research, the lack of a “common language” impairs data collection and analysis as patients with a different diagnosis would be aggregated as having abdominal migraine adding a component of randomness to the investigation. In an uncommon disorder where collaboration to achieve adequate sample size is paramount, the absence of common diagnostic criteria can potentially undermine the success of needed research projects.

The study also found that patients are studied and treated similarly regardless of their diagnostic criteria. The variation in patient management between pediatric gastroenterologists and neurologists, in the absence of evidence-based data, is likely the result of anecdotal experience or unproven style of care. Although one could argue that the high rate of improvement of symptoms regardless of the variations of medical care indicates against the need of standardized evidence-based treatments, very few patients experienced resolution of their symptoms. The important impact of this recurrent disorder in the child’s health and the latency in diagnosis found in our study should encourage the medical community to achieve a deep knowledge of this disabling disorder. The results of this retrospective cross-sectional study should be taken with caution due to the study design and single center collection of data that cannot assure external validity. There was also a limitation in that we relied very heavily on the information that was documented by physicians. If details or symptoms weren’t documented, we didn’t have another way of knowing if a patient had that symptom. Therefore, the question of whether a patient met criteria for abdominal migraines could be affected.

In conclusion, we found infrequent use of established diagnostic criteria and high variations in diagnostic workup and treatment in children with

abdominal migraine. Large, collaborative multi-center clinical trials using common diagnostic criteria should be conducted to establish the optimal treatment to improve the outcome of children with abdominal migraine.

## Ethical Responsibilities

**Human Beings and animals protection:** Disclosure the authors state that the procedures were followed according to the Declaration of Helsinki and the World Medical Association regarding human experimentation developed for the medical community.

**Data confidentiality:** The authors state that they have followed the protocols of their Center and Local regulations on the publication of patient data.

**Rights to privacy and informed consent:** The authors have obtained the informed consent of the patients and/or subjects referred to in the article. This document is in the possession of the correspondence author.

## Conflicts of Interest

Authors declare no conflict of interest regarding the present study.

## Financial Disclosure

Authors state that no economic support has been associated with the present study.

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