



## CASE VIGNETTE

*"It's just getting worse and worse. Now it looks like I might flunk out."*

Elise, a 15-year-old in the tenth grade, presents with a one-year history of intermittent headache. She is accompanied by her mother, Claire. Her physical exam, done after the history, is normal.

***I'm going to talk with you both first, Elise, then I'll ask your mother to wait in the reception area. I'll ask you some more questions, then I'll speak with your mother for a few minutes and after that I'll do a physical exam to make sure there's nothing to be worried about. Then we'll all talk about the diagnosis and the treatment plan.***

***Tell me about your headaches, Elise. Where do you feel the pain and how severe is it? Do you have any other symptoms in addition to the head pain? How long do the headache attacks last?***

Her headache is bifrontal and throbbing. The severity varies; when the pain is bad she must lie down in a dark quiet place. These severe headaches are accompanied by photophobia and phonophobia, and last from 1-4 hours. They usually come on fairly suddenly in the morning. She has no aura, no nausea or vomiting with the attack, and movement does not exacerbate the head pain.

***You say you have been getting headaches for about a year? Has the frequency or severity changed over time? How often are you getting the really bad headaches?***

When it started she would get the severe headaches about once a month and she could live with it. For the past few months she's been getting them about twice a week. Now it's affecting her whole life and she doesn't know what to do.

***How are you managing with school? Are the headaches affecting your schoolwork?***

Elise says she has missed 20 days of school this past year and is at risk for flunking due to attendance problems. Her mother says it was more like 15 days and that the school is being very inflexible, especially since Elise had A- to B grades in the past. She used to be involved in student council, and lacrosse after

school, but has curtailed these activities because of her headaches.

***Does anyone else in the family have a headache problem?***

Claire answers and says she had "sick headaches" when she was in her twenties and early thirties, but they improved over time and she has not had one in some years. Elise's brother, a high school senior, does not have headaches and her father boasts that he "never had a headache in his life."

***Do you have any other medical conditions or health concerns? What medications are you currently taking, either for the headache or other reasons?***

Her medical history is significant for asthma and sinusitis. She is currently taking Advil and Midrin for her bad headaches, about 4-6 tablets/capsules per attack, but they are not helping.

***Now I'd like to talk with Elise alone for a few minutes.***

***Elise, I'm going to have a private conversation with your mother as well, just to be sure I know everything that is going on with your headaches and how they are affecting you. Our conversation is confidential, and I won't share anything you tell me with your parents unless you specifically tell me it's okay to do so.***

***I understand you are worried you might flunk some of your courses. Is anything else bothering you—related to the headaches or not? Are there any big stresses in your life right now that you are having to deal with?***

She is worried about a brain tumor, and whether she will have to go to summer school. Otherwise things are okay. She does not feel anxious or depressed or particularly stressed, except for the worry about summer school.

***A brain tumor is extremely unlikely, given your history. If your physical exam is normal then we really have nothing to***

***worry about. There are a number of lifestyle factors that can contribute to increased headache frequency. Tell me about your usual eating and sleeping patterns.***

She tries to eat healthily, going easy on the fat, sugar and caffeine. She always has something for breakfast, sometimes skipping lunch then eating after school. She has been sleeping okay, without any insomnia or early morning awakening. She will sleep in on the weekend but only to mid-morning.

***Do the headaches have any effects on your relationship with your family? With your friends?***

Her mother is supportive. Her father "isn't exactly unsupportive" but jokes about her headaches, saying she's just like her mother; her mother was always "checking out" with a headache too. She doesn't get along with her older brother anyway, with or without headaches. Her friends are fine. The headaches hit early in the day so they don't really affect getting together with her friends.

***There are some personal issues that can have an effect on the headaches or on how we decide to treat them, so I need to ask about them. When did you start having your periods? Are they regular? Do you have any premenstrual symptoms that bother you?***

Menarche was at age 13 1/2. Her periods aren't very regular and sometimes take her by surprise. Bloating and constipation usually tip her off that a period is coming, but she's not aware of other premenstrual symptoms or any increased headache.

***Are you taking birth control pills? Are you sexually active? Do you drink or use drugs?***

She denies contraceptive use and sexual activity but has a boyfriend. She smokes pot about once a month and has a beer or two on the weekends with her friends.

***Now I'm going to talk with your mother for a few minutes, to find out if she is aware of any patterns or problems that***

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**might be good to know about. Whatever she tells me is confidential, just as our conversation is confidential.**

**Claire, do you have any concerns or worries about your daughter? Is there anything you want to tell me without your daughter present?**

She is worried about her daughter's grades and wants something done about the headaches. She and her daughter are "friends," and she defends her when her husband comments that these headaches never seem to strike on the weekends or when there's something Elise wants to do. He, the husband, means well, but doesn't understand what it's like to have bad headaches. Except for the misery of headache, Elise seems cheerful and has a normal social life.

**PRETEST**

1. What is the diagnosis?
2. Name two medications that could be tried, with the rationales for your choices.
3. Are there psychosocial issues also needing attention? What are they?
4. Is any further work-up advisable?

**COMMENTARY**

**Tell me about your headaches, Elise. Where do you feel the pain and how severe is it? Do you have any other symptoms in addition to the head pain? How long do the headache attacks last?**

The throbbing, severe pain and the presence of photo- and phonophobia would suggest migraine, but her headaches would not meet the 1988 International Headache Society (IHS) criteria for pediatric migraine, which specify a duration of 4-72 hours. However, it has since been established that children and adolescents frequently have headaches of shorter duration that otherwise meet diagnostic criteria for migraine. While a bilateral location is less common in adult migraineurs, it is common in children and adolescents with migraine.

**You say you have been getting headaches for about a year? Has the frequency or severity changed over time? How often are you getting the really bad headaches?**

An increase in frequency or severity is not unusual with benign headache conditions but requires careful investigation to rule out organic syndromes. Depending on how well her headaches respond to more specific medications, she may require preventive treatment as well.

**How are you managing with school? Are the headaches affecting your schoolwork?**

The impact on school performance is substantial. She should be treated as aggressively as her age permits and followed closely to be sure the headaches are responding.

**Does anyone else in the family have a headache problem?**

The fact that the mother has a history of headaches that were most likely migraines provides some additional support for the diagnosis of pediatric migraine.

**Do you have any other medical conditions or health concerns? What medications are you currently taking, either for the headache or other reasons?**

Comorbidity of asthma, sinusitis and migraine has been reported, but it is not well documented and the implications for management are not worked out. Her current level of medication use would not suggest medication rebound headache, but should be reevaluated if the headaches do not respond to treatment. At follow-up, questioning her about her continued use of Advil/Midrin, which should decrease, can help to gauge the success of the prescribed regimen.

**Elise, I'm going to have a private conversation with your mother as well, just to be sure I know everything that is going on with your headaches and how they are affecting you. Our conversation is confidential, and I won't share anything you tell me with your parents unless you specifically tell me it's okay to do so.**

Although time-consuming, interviewing each family member privately can be vital to uncovering behavioral problems that may not only undermine headache treatment, but may put the patient at greater risk for psychiatric disorders, school failure, or other serious consequences.

**I understand you are worried you might flunk some of your courses. Is anything else bothering you—related to the headaches or not? Are there any big stresses in your life right now that you are having to deal with?**

Her acknowledged concerns are understandable. She appears nervous and self-conscious, but she seems sincere and forthright in her answers. She denies depression and shows no overt signs of it.

**A brain tumor is extremely unlikely, given your history. If your physical exam is normal then we really have nothing to worry about. There are a number of lifestyle factors that can contribute to increased headache frequency. Tell me about your usual eating and sleeping patterns.**

Her eating and sleeping patterns are fairly normal, are not suggestive of an underlying mood disorder,

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and are probably not a significant factor in triggering her headaches.

***Do the headaches have any effects on your relationship with your family? With your friends?***

Adolescents may deny or may simply lack sufficient self-awareness to articulate mood problems or identify major stressors that may exacerbate headache. Multiple questions on mood, behavior, family dynamics, and peer relationships are often advisable. While her father's attitude could be improved, there is no other evidence of family dysfunction and Elise is not isolated socially.

***There are some personal issues that can have an effect on the headaches or on how we decide to treat them, so I need to ask about them. When did you start having your periods? Are they regular? Do you have any premenstrual symptoms that bother you?***

In females, the onset of migraine is often associated with the menarche, and migraine attacks may occur more frequently directly before or during menses. For young women with irregular menses, a link between the timing of migraine attacks and menses may be more difficult to ascertain. The menstrual history can be part of the medical history taken in the parent's presence if the patient seems unembarrassed. Alternatively, it can be included in the private portion of the interview and can lead easily to questions about sexual activity.

***Are you taking birth control pills? Are you sexually active? Do you drink or use drugs?***

The possibility that Elise may become sexually active and at risk for an unplanned pregnancy should be considered in selecting medication. Assuming she is honest about her level of consumption, her substance use is not unusual or alarming; a "lecture" on the subject might damage her trust and discourage future confidences.

***Claire, do you have any concerns or worries about your daughter? Is there anything you want to tell me without your daughter present?***

Elise and Claire both imply that the father's skeptical remarks are unimportant, but some education here would surely make things easier for the family. The father should be urged to accompany his daughter on a follow-up visit. Claire's sympathetic stance is positive, but there is a suggestion that she may be overly involved with her daughter. If Elise's headaches do not respond to therapy, then the possibility should be examined that this is a "caretaker" relationship which may reward or encourage continued disability.

**PROPOSED DIAGNOSTIC CRITERIA FOR PEDIATRIC MIGRAINE WITHOUT AURA**

- A. At least 5 attacks fulfilling B-D
- B. Headache attack lasting 30 minutes to 48 hours
- C. Headache has at least 2 of the following:
  - 1. Bilateral (frontal/temporal) or unilateral location
  - 2. Pulsating quality
  - 3. Moderate to severe intensity
  - 4. Aggravation by routine physical activity
- D. During headache, at least 1 of the following:
  - 1. Nausea and/or vomiting
  - 2. Photophobia and phonophobia

**DIAGNOSING HEADACHE IN CHILDREN AND ADOLESCENTS**

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As with adults, a complete history should include the historical background of the headache disorder and a thorough description of the headache as it presents now, as many headache disorders evolve over time.<sup>1</sup> Once you have obtained the child's headache and medical history, you should have a fairly good understanding of the child's headache disorder. Issues such as time to peak intensity and time to vomiting are helpful in planning treatment. The presence of severe nausea at the onset of headache may alter choice of abortive medications.

The general exam should include head circumference and blood pressure. Examination of the skin for neurocutaneous lesions is indicated. The neurologic exam should include visual fields by confrontation and cranial auscultation. In many instances this is the first complete exam the patient has received for this disorder. If the child's exam is normal, as is most often the case, this fact should be conveyed to the family in a very affirmative manner.

**MIGRAINE WITHOUT AURA (COMMON MIGRAINE)**

As with adults, a migraine headache in children may also be heralded by a change in the child's behavior and/or mood, although not always recognized. The prodrome can consist of euphoria, depression, irritability, lethargy, yawning, food cravings, increased thirst or pallor. The headache may be of sudden or

gradual onset. Not uncommonly the headache will escalate from a minor to a severe headache within less than 30 minutes. The headache is frequently a bilateral frontal throbbing headache. Many children complain of abdominal discomfort and will quickly go on to vomit. The episode of emesis may or may not relieve the child's headache. Photophobia and phonophobia may be quite severe. Many children will seek out a dark quiet place when they have a moderate to severe headache. Adolescents, particularly girls, often complain of dizziness or lightheadedness with their headaches. Osmophobia can be quite significant in a small subset of this population.

Common migraine headache lasts anywhere from 30 minutes to 72 hours. Headaches lasting greater than 72 hours are diagnosed as status migrainosus. This is sometimes seen in children, particularly in the adolescent population.

Children may sleep as long as 8-10 hours after experiencing a relatively severe headache. At times, vomiting can be quite significant and may lead to mild to moderate dehydration. Thus, if the child requires hospitalization for parenteral therapy, IV hydration is also recommended.

Many children who experience relatively severe headaches of short duration lasting 1-2 hours have complete and total recovery within 3-4 hours of the onset of their headache. The neurologic examination prior to, during, and following the migraine headache is normal in migraine without aura. No abnormal neurologic findings should be ascribed to the migraine. It is not uncommon for the child to feel warm during the attack. Although families frequently report fever with headache, usually the temperature has not been taken. Fever is a very uncommon symptom of an uncomplicated migraine headache. The presence of fever should alert the examiner to an alternate diagnosis. Streptococcal pharyngitis is frequently associated with fever and headache. Meningitis is associated with nausea, vomiting, headache, lethargy and fever. If an appropriate history is obtained, it is unlikely that these conditions could be mistaken for common migraine headache.

**MIGRAINE WITH AURA (CLASSIC MIGRAINE)**

In children as adults, a visual aura is most common, in which the child reports seeing either spots, dots or bright lights. Many children have difficulty describing their aura and may not give classic symptoms of a scotoma or a hemianopsia. By definition, the aura symptom develops gradually over more than 4 minutes, or 2 or more symptoms occur in succession. The aura should not last more than 60 minutes. The headache then follows the aura within 60 minutes. It is not uncommon for patients to experience just the aura with no headache or for the aura phase to continue into the headache phase.

Although visual auras are the most common in childhood, other sensory and autonomic auras can occur as well. Numbness and tingling in one extremity, moving up the extremity onto the face and into the mouth to involve the tongue and gums has been described by some of the older patients. Abdominal pain is a frequent concomitant symptom of migraine headache but may also be an aura to a classic migraine headache. Cyclic vomiting is thought to be a migraine equivalent, in which the abdominal discomfort is the main and only manifestation of the migraine. During the aura, the patient's neurologic examination will be abnormal based on the neurologic deficits that the child is experiencing. Following resolution of the aura phase, any neurologic symptoms should resolve.

## LABORATORY EVALUATION

Laboratory studies such as CBC, basic chemistries, complete metabolic profiles, thyroid function, or studies for inflammatory disorders such as lupus or vasculitis are unrewarding. Unless the patient has a clinical symptom to suggest a specific disorder, it is unlikely that anything specific related to the headache will be found.

Neuroimaging has been frequently used in the evaluation of children with headache. However, if the clinical diagnosis is consistent with migraine headache as outlined above, the usefulness of neuroimaging is questionable. In a recent review of this issue, Lewis and Dorband concluded that neuroimaging is not indicated if the child has a normal neurologic exam.<sup>2</sup> Although abnormalities were noted on some studies, they were incidental and not clinically significant. It is imperative to note that in their review of the literature, all patients who presented with significant CNS disease, brain tumors, or symptomatic arterio-venous malformations had an abnormal neurologic exam. When this information is shared with patients and their families, it is far easier to avoid the costly imaging study.

## References

1. Guidetti V, Galli F. Evolution of headache in childhood and adolescence: an 8-year follow-up. *Cephalalgia* 1998;18:449-454.
2. Lewis DW, Dorband D. The utility of neuroimaging in the evaluation of children with migraine or chronic daily headache who have normal neurologic exam. *Headache* 2000;40:629-632

## Patient Resources:

American Council for Headache Education (ACHE) website, "Kids and Headache" page: <http://www.achenet.org/kids/>

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# PSYCHOSOCIAL ISSUES IN PEDIATRIC HEADACHE

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Pharmacologic measures alone are often ineffective in the management of children with headache. When developing a comprehensive management program for a child or adolescent with chronic headaches, it is essential to become aware of interwoven psychosocial aspects. A thorough medical history is fundamental in this process to identify the presence of *predisposing, precipitating, or aggravating factors*.

## DEPRESSION

While the comorbidity of depression and recurrent headache is well established in adult populations, this association has not been so clearly shown in children. Depressive symptoms have been reported in 40%-86% of children evaluated in pediatric headache clinics; however, controlled studies of the association of depression and headache vary widely in their results.<sup>12</sup> Should symptoms of depression be elicited, the headache management regimen may be adapted to include psychological counseling and daily prophylactic agents such as a tricyclic antidepressant (e.g., amitriptyline) or selective serotonin reuptake inhibitors.

## ANXIETY

Adolescents with recurrent headaches reported higher anxiety levels and greater *perceived* stress than peers without headache.<sup>3</sup> In addition, children and adolescents with prominent symptoms of anxiety are likely to experience more frequent and more severe attacks of headache.<sup>4</sup> One source of anxiety stems from concerns regarding the cause of the headache. Children with recurrent headache as well as their families are often fearful of brain tumors. Children as young as 5 or 6 years old reported an overwhelming fear that their headaches could be due to brain tumors, a thought planted by parents, siblings, TV or movies. One of the most valuable therapeutic interventions is confident reassurance as to the absence of serious underlying disease. As with depression, if symptoms of anxiety are present, the treatment regimen may be tailored to include anxiolytic agents, stress management, biofeedback, and psychological counseling.

## STRESS

Stress is the most frequently identified precipitating factor in surveys of adult headache populations and a very commonly identified trigger during childhood.<sup>5-7</sup> Evidence suggests that children with headache, specifically migraine, might be *more sensitive to stress* than headache-free controls. While children with migraine

do not experience more stressful lives than controls, they *react* with a headache attack to a normal amount of stress or anxiety.

Stress management can be an extremely useful and long-lasting therapeutic intervention. Techniques involve:

- identification of and reaction to stressors
- changing thoughts and images about stressful situations
- acquisition of coping strategies to manage stress

A combined approach with psychological counseling, cognitive therapies, biofeedback, and relaxation training may be useful therapeutic techniques. Relaxation therapies include muscle relaxation, imagery-based relaxation, breathing exercises as well as massage therapy and self-hypnosis. Holden and colleagues critically reviewed published psychological interventions for pediatric headache and concluded that sufficient evidence existed to state that relaxation therapy with self-hypnosis is also an efficacious treatment for recurrent migraine and tension-type headache in children.<sup>8</sup>

## SOMATIC COMPLAINTS

Children with headaches report higher levels of other somatic complaints than headache-free controls. Other types of pain, such as abdominal, back, and neck pains are more frequent in children with headache than in controls. In addition, children with headache complain of increased tiredness, appetite loss, breathing problems, and "eye tiredness" more than controls. These observations suggest that children and adolescents with chronic headache are more somatically focused than their counterparts.

## PRECIPITATING OR AGGRAVATING FACTORS

**Sleep.** Either too much, too little, or inconsistent sleep patterns contribute to the headache burden. Sleep hygiene is essential. Particularly during the adolescent years, a deviation from established patterns of sleep could precipitate or exacerbate headache cycles.

**Diet.** The traditional "avoidance diet" excludes aged cheeses, processed meats, pickles, MSG, and chocolates. Few studies, however, have demonstrated a clear beneficial effect of dietary elimination schedules. A more reasonable approach is to review the "list" of foods that have been linked to triggering headache and to ask the patient to note any temporal associations between ingestion of the foods and the development of headache. The dictatorial prohibition of an arbitrary list of foods is not reasonable, will not be complied with, and may generate a source of conflict as parents attempt to enforce it.

Two dietary issues are less controversial: skipping meals and caffeine consumption. Adolescents will often omit breakfast and/or lunch. In the process of regulating the lifestyle, it is necessary to encourage a

regular eating schedule. A link between caffeine and migraine has been established. Not only does caffeine itself seem to have an influence on headache, but caffeine may disrupt sleep or aggravate anxiety symptoms, both of which may exacerbate headache. Every effort must be made to moderate caffeine use.

**Analgesic overuse.** The excessive use of over-the-counter analgesics has a well-demonstrated role in the transformation of intermittent headache into chronic daily headache patterns. Intake of analgesics more than 2-3 times per week can increase the frequency and severity of headaches. Furthermore, abuse of analgesics interferes with the effectiveness of both prophylactic and psychological interventions. Analgesics associated with medication rebound headache include acetaminophen, aspirin, ibuprofen, and butalbital agents.

**Exercise.** While there are no controlled studies in children demonstrating a decrease in headache patterns following the establishment of an exercise program, patient education websites include the universal recommendation for “regular exercise programs” for tension-type headache, migraine and chronic daily headache.

**Activities.** As with sleep, either too much or too little activity can be associated with headache. A diary of daily events will assist with appreciation of the lifestyle and identify provocative or aggravating phenomena. Compulsive, overachieving adolescents can so completely fill their every waking moment that there is inadequate time for them to complete tasks to their own satisfaction. This generates a vicious cycle of frustration, anxiety, stress, and sleep disturbances. Development of time management skills becomes essential for these patients. There is a subset of adolescents who, conversely, withdraw from activities. This population can benefit from immersing themselves into activities, which may simply be a distraction from their headaches.

**School issues.** School is one of the most commonly identified triggers for children’s headache. Furthermore, headache ranks as the third most common illness-associated cause of school absence. A vicious cycle develops. Underlying issues at school that aggravate headache include: occult learning disabilities, being the target of bullying, fear of underperformance, and parental expectations.

To compound the problem further, conflicts erupt among parents, school and child as the number of days missed increases. The parents want the child to go to school but feel guilty about forcing the child to attend with a headache. To complicate the matter further, the parents’ life and work schedules are often disrupted when their child is experiencing frequent headache and school absences. The management of this problem includes:

- behavioral contracts which specify full-time school attendance

- parental counseling
- re-establishment of a routine in the family lifestyle
- communication between the school and the family to foster a cooperative, supportive effort

Treatment strategies must be put into place so that if a headache attack occurs in school, the child and the family have confidence that prompt efforts will be instituted to treat the attack according to the doctor’s orders. *Avoid homebound programs!*

## SUMMARY

It is likely that the majority of children and adolescents with chronic headaches have interwoven psychosocial factors that may contribute to the frequency and severity of their headaches. Depressive symptoms, anxiety, and stress are common comorbidities in adolescents with headache. Awareness and recognition of these factors will have an impact on the selection of treatment options such as counseling, stress management, relaxation training, biofeedback, or pharmacologic options including antidepressants or anxiolytics. While most of these therapies can be coordinated through the primary care provider, detection of moderate or severe psychological factors may necessitate the inclusion of mental health specialists in the treatment team.

## References

1. Ling W, Oftedal G, Weinberg W. Depressive illness in childhood presenting as severe headache. *Am J Dis Child* 1970; 120:122-124.
2. Kaiser RS. Depression in adolescent headache patients. *Headache* 1992; 32:340-344.
3. Larsson B. The role of psychological, health behavior and medical factor in adolescent headache. *Dev Med Child Neurol* 1988; 30:616-625.
4. Cooper PJ, Bawden HN, Camfield PR, Camfield CS. Anxiety and life stress in childhood migraine. *Pediatrics* 1987; 79:999-1004.
5. Passchier J, Orlebeke JF. Headache and stress in schoolchildren: an epidemiological study. *Cephalalgia* 1985; 5:167-176.
6. Lewis DW, Middlebrook MT, Mehallick L, et al. Pediatric headaches: what do the children want? *Headache* 1996; 36:224-230.
7. Anttila P, Metasahonkala L, Helenius H, Sillanpaa M. Predisposing and provoking factors in childhood headache. *Headache* 2000; 40:351-356.
8. Holden EW, Deichmann MM, Levy JD. Empirically supported treatments in pediatric psychology: recurrent pediatric headache. *J Pediatr Psychol* 1999; 24:91-109.

### Additional Reading

Winner P, Rothner AD (eds). *Headache in Children and Adolescents*. Hamilton, Ontario: B. C. Decker, Inc., 2001.

# TREATMENT OF PEDIATRIC MIGRAINE

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## ABORTIVE THERAPY

Pharmacologic therapy is one of the mainstays for the abortive management of childhood migraines. Very few placebo-controlled, randomized, double-blind studies of abortive therapy in children have been performed. Anecdotal or retrospective studies are therefore used to guide treatment. These studies are limited by a significant placebo effect in migraine, especially in children. Key features to be addressed in abortive therapy include: (1) using adequate doses of medications adjusted by weight, (2) catching the headache at its onset, and (3) avoiding overuse of abortive medications.

**Over-the-Counter Medications.** OTCs are frequently used for children’s headaches, often improperly, long before the initial evaluation. These medications include acetaminophen, nonsteroidal anti-inflammatory drugs (NSAIDs), and combination therapies (e.g., aspirin/caffeine/acetaminophen). Aspirin and aspirin-containing compounds should be avoided in children under age 15, given the controversial association with Reye’s Syndrome.

The effectiveness of ibuprofen in comparison to acetaminophen and placebo has been examined in a double-blind placebo-controlled crossover study.<sup>1</sup> Both ibuprofen (10 mg/kg) and acetaminophen (15 mg/kg) were found to be more effective than placebo, with ibuprofen superior. Other NSAIDs have not been examined for childhood headaches. Observations in adults suggests that there may be individual variation in response. It may, therefore, be useful to try alternative NSAIDs if the initial treatment is ineffective. The combination of aspirin and caffeine has been shown to be effective in aborting headaches in adults. A child-friendly equivalent can be created by combining ibuprofen with a caffeinated drink.

**Prescription Medications.** Many non-migraine-specific medications that contain barbiturate hypnotics or opioid analgesics have been used in adults. Only anecdotal reports of their effectiveness in children and adolescents have appeared. The inability to accurately and effectively dose these medications for headaches in children has limited their use.

The triptans have begun to be examined for children, particularly sumatriptan, the first medication in this class. Its effectiveness in adults, including oral, nasal and injectable formulations, has been well-documented. In adolescents, however, the oral form has not been shown to be significantly beneficial over placebo in several studies. It has been speculated that this may be due to slow oral absorption and penetration into the brain.

AGENT	AGE GROUP	DOSING
Acetaminophen	All ages	15 mg/kg/dose <sup>†</sup>
Ibuprofen	All ages	10 mg/kg/dose <sup>†</sup>
Almotriptan	5-12 yrs	6.25 mg ↑ as tolerated to
	> 12 yrs	12.5 mg <sup>†</sup>
Rizatriptan	5-12 yrs	5 mg ↑ as tolerated to
	> 12 yrs	10 mg <sup>†</sup>
Sumatriptan nasal spray	5-12 yrs	5 mg ↑ as tolerated to
	> 12 yrs	20 mg <sup>†</sup>
Zolmitriptan	5-12 yrs	2.5 mg ↑ as tolerated to
	> 12 yrs	5 mg <sup>†</sup>

<sup>\*</sup> Limited to 2 doses per attack; may be supplemented with caffeinated soda.  
<sup>†</sup> Pharmacokinetics unknown in younger children and dosing has not been established with double-blind studies. In young children start at lowest available dose; increase if not completely effective.

Furthermore, children's increased nausea and vomiting may decrease intestinal motility during a migraine and limit the amount of available medication during the migraine attack. Two small retrospective studies have found the subcutaneous form to be effective in children, while the nasal form has been shown to be effective in adolescents in a randomized, double-blind, placebo-controlled study.<sup>2</sup> Nasal sumatriptan also appears to be effective and well tolerated in younger children. Some of the newer triptans have a more rapid oral absorption and are currently undergoing large-scale investigation in adolescents. They should add to the available medications used to treat childhood headaches. Oftentimes finding the best triptan is a trial-and-error process.

**Emergency Department and In-Patient Management.** For those headaches that are unresponsive to at-home medications, emergency department management and inpatient care may be necessary. Antiemetics such as prochlorperazine (0.15 mg/kg in normal saline) have been shown to be highly effective in aborting adult migraines using an intravenous route. In addition to the antiemetic effects, the dopaminergic antagonism may have a direct central effect on aborting migraines. In children, prochlorperazine in combination with intravenous hydration is also very effective and can serve as a first-line agent for aborting these headaches in the emergency department.<sup>3</sup> When this is ineffective or incompletely effective, dihydroergotamine should be considered.<sup>4</sup>

AGENT	DOSAGE	NOTES
Amitriptyline <sup>5</sup>	1.0 mg/kg	↑ 0.25 mg/kg/day every 2 weeks. Consider an EKG
Cyproheptadine	0.25 to 0.5 mg/kg/day divided bid	Max. dose: 12 mg for 2 - 6 year olds, 16 mg for 7 - 14 year olds
Divalproex (Depakote Sprinkle)	20 mg/kg/day divided bid	↑ 5 mg/kg/day every 2 weeks. Monitor CBC and LFTs.
Propranolol	1 mg/kg bid	Avoid use if history of depression, syncope or asthma.

**Analgesic overuse.** Special care needs to be taken to avoid the overuse of any abortive medication, including OTCs, caffeine, and prescription medications. Frequent use of abortive medication carries the risk of the development of analgesic rebound headaches. This may occur as quickly as 2 weeks in adults and even sooner in children. Ideally, OTCs and/or caffeinated beverages should not be used more often than 2-3 times a week in any combination, and triptans should be limited to less than 3-4 times a month. If the frequency of the headaches makes these restrictions difficult or the headaches are significantly disabling then preventive medication is warranted.

### PROPHYLACTIC THERAPY

The goal of preventive therapy should be to minimize the disability of the headache and return the patient to full functioning, including school attendance and participation in extracurricular and social activities. To attain this goal, the prophylactic medication must be carefully chosen based on the patient's medical history, slowly increased to an adequate dose, and used for an adequate period of time. Once the desired therapeutic goal is sustained for several months, the medications may then be slowly withdrawn.

A variety of prophylactic medications have been used. These include antidepressants, antiepileptic, antihypertensive (beta blockers and calcium channel blockers), and antiserotonergic medications. Placebo-controlled studies have shown the effectiveness of prophylactic medications in adults, but again are lacking in children. Some of the more frequently used preventive medications in children are given in the table below.

### NON-PHARMACOLOGIC THERAPY

Many non-pharmacologic methods are used to attempt to control the child's headaches but often the effectiveness is unsubstantiated. The usefulness of dietary restrictions and avoidance of trigger events has been questioned, with only a small number of patients having clearly identifiable triggers. Furthermore, these restrictions may negatively affect quality of life. A more effective method may be to learn how to modify one's reactions to such an event. In this regard, biobehavioral therapy, including biofeedback-assisted relation training (BART), may be quite beneficial. BART may not only assist in the child's ability to tolerate trigger events, but may also be used as an effective abortive and prophylactic therapy. Biobehavioral therapy also includes the development of a healthy lifestyle. For children this includes balanced nutrition, regular meals, regular and adequate sleep, exercise, and hydration.

### References

- Hämäläinen ML, Hoppu K, Valkeila E, Santavuori P. Ibuprofen or acetaminophen for the acute treatment of migraine in children. *Neurology* 1997;48:103-107.
- Winner P, Rothner D, Saper J, et al. A randomized, double-blind, placebo-controlled study of sumatriptan nasal spray in the treatment of acute migraine in adolescents. *Pediatrics* 2000;106:989-997.
- Kabbouche M, Vockell ALB, LeCates SL, Powers SW, Hershey AD. Tolerability and effectiveness of prochlorperazine for intractable migraine in children. *Pediatrics* 2001;107:E62.
- Linder S. Treatment of childhood headache with dihydroergotamine mesylate. *Headache* 1994;34:578-580.
- Hershey AD, Powers SW, Benti A-L, deGrauw TJ. Effectiveness of amitriptyline as a prophylactic treatment for pediatric migraines. *Headache* 2000;40:539-549.

### POSTTEST—TRUE OR FALSE

- Diagnostic criteria for pediatric migraine do not differ significantly from those for migraine in adults.
- Neuroimaging is generally unnecessary in children meeting diagnostic criteria for pediatric migraine, providing the neurologic exam is normal.
- Until treatment yields significant improvement, homebound schooling should be considered for children with very frequent or severe headaches.
- Oral sumatriptan is the treatment of choice for pediatric headache.
- Biofeedback and relaxation training may be tried in adolescents but are generally ineffective for younger children with headache.

### ANSWERS—PRETEST

- Migraine without aura, typical of the shorter duration seen in the pediatric/adolescent population.
- A fast-acting triptan, such as subcutaneous or nasal sumatriptan would be appropriate; oral rizatriptan or zolmitriptan may be effective if the patient strongly prefers a po formulation. Medications requiring more than 30 minutes to act are unlikely to be helpful. Preventive medications may be needed if acute medications are ineffective or overused.
- The father and the school officials need education about headache. The father can be asked to come to the follow-up visit. Letters and/or phone calls to the principal and teachers should explain the condition and the treatment plan, and urge flexibility in allowing makeup work or extensions until the headaches are under control.
- No studies are needed. A headache calendar or diary might be advisable for investigating possible triggers.

### ANSWERS—POSTTEST

- F
- T
- F
- F
- F