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Consultation with

the Specialist

Diagnosis and Management of Headache in Children

Balbir V. Singh, MD* and E. S. Roach, MD*

Introduction

Headache is an age-old problem that affects both children and adults; it is mentioned as far back as 5000 BC in Babylonian and Sumarian writings and later is described by Hippocrates and Galen. In spite of more than 50 epidemiologic studies, there is no consensus on the prevalence of headache. The prevalence of chronic headache varies widely in different studies, probably due to differences in case definition, selection criteria, and demographics of the study populations. Most recent studies suggest rates close to 5% for migraine, 15% for tension-type headache, and about 30% for infrequent nonmigrainous headaches. Nevertheless, most children who suffer migraines never come to medical attention.

The International Headache Society's classification system has replaced the old and somewhat confusing terminology with more descriptive terms (Table 1). Migraine is divided into three types: migraine without aura (Table 2), migraine with aura (Table 3), and complicated migraine. Tension and muscle contraction headache have been replaced by tension-type headache, admitting our ignorance of the pathophysiology of the disorder (Tables 4 and 5). Operational diagnostic criteria are used to increase both the sensitivity and the specificity of diagnosis.

Migraine

Migraine is an episodic syndrome characterized by headaches of

varying intensity, duration, and frequency. Before puberty, migraine is slightly more common in boys; after puberty, it is two to three times more common in girls. Eighty percent of all migrainous headaches are comprised of migraine without aura. The headache often is unilateral (35%) and throbbing (55%), but it may be diffuse and continuous in more than 50% of the children. Other common signs and symptoms include pallor, irritability, malaise, and fatigue. Nausea, vomiting, and abdominal pain occur in about 90% of cases. The pain may last from minutes to several hours. Photophobia and phonophobia are common.

Severity of symptoms ranges from episodes that force the child to seek relief in a quiet and dark place to detection only upon direct questioning. The most accurate way to assess the severity of a headache in young children is to determine its effect on the child's normal activities. Family history of migraine is present in about 70% of patients. Stress; anxiety; lack of sleep; over-

sleeping; menstruation; hunger; and ingestion of alcohol, caffeine, and some foods (eg, chocolate, cheese, and monosodium glutamate) may precipitate an attack. Sleep provides relief to 95% of children.

Migraine with aura constitutes 15% to 20% of vascular headaches. An aura most often consists of visual symptoms (eg, scintillating scotomas, blurred vision, hemianopsia), but almost any neurologic deficit can result from migraine. The aura typically is followed by a pounding headache on the opposite side. Other symptoms are similar to those of migraine without aura.

The term complicated migraine is used when the signs of an aura last throughout the headache or persist afterwards. Depending on the area of cerebral cortex affected, a complicated migraine may cause hemiparesis, sensory loss, aphasia, ophthalmoplegia, blindness, macropsia, micropsia, vertigo, ataxia, quadriplegia, transient global amnesia, confusional state, or loss of consciousness.

TABLE 1. Etiology of Recurrent Headaches

Vascular Headaches Migraine Arteriovenous Malformations
Tension-type Headache
Headache Due to Increased Intracranial Pressure Space-occupying Lesions Idiopathic Intracranial Hypertension (Pseudotumor cerebri)
Other Causes Systemic Diseases Sinusitis Ocular Diseases Temporomandibular Joint Diseases

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TABLE 2. International Headache Society Diagnostic Criteria for Migraine Without Aura

- Headache attack lasts 4 to 72 h
- Headache has at least two of the following characteristics:
 - Unilateral location
 - Pulsating quality
 - Moderate to severe intensity
 - Aggravation by routine physical activity
- During headache, at least one of the following occurs:
 - Nausea and/or vomiting
 - Photophobia and phonophobia
- At least five attacks occur that fulfill the above criteria
- Results of the history, physical examination, and neurologic examination do not suggest any underlying organic disease

TABLE 3. International Headache Society Diagnostic Criteria for Migraine With Aura

- At least three of these four characteristics are present:
 - One or more fully reversible aura symptoms indicate focal cerebral cortical and/or brain stem dysfunction
 - At least one aura symptom develops gradually over more than 4 min
 - No aura symptom lasts more than 60 min (duration proportionally increases if more than one aura symptom is present)
 - Headache follows the aura with a free interval of less than 60 min (may begin before or with the aura). It usually lasts 4 to 72 h, but may be completely absent
- At least two attacks occur that fulfill the criteria listed above
- Results of the history, physical examination, and neurologic examination do not suggest any underlying organic disease

Tension-type Headaches

Tension-type headaches typically are generalized or focused posteriorly and may be described as a band-like sensation. They can be either episodic or chronic and are more common in adolescent girls than in children younger than 10 years of age. Nausea is rare, but fatigue and dizziness are common. The description of the headache and accompanying symptoms are often vague and nonspecific.

The mechanism through which pain is caused is not clear. Prolonged muscle contraction with accompanying ischemia of the involved muscles and psychogenic factors may play a role. Although the headaches may persist for weeks or months, they may not disrupt the child's regular activities. In some children, symptoms of tension-type headache and migraine overlap, making the diagnostic distinction

more difficult. There may be secondary gain in the form of prolonged school absences in spite of good academic performance. Underlying factors include stress, depression, conversion, and adjustment reactions. The relationship of depression to tension-type headache is not straightforward. Many patients who have chronic daily headaches become depressed, but in some patients headaches are caused by depression and resolve as soon as depression improves.

Headaches Secondary to Increased Intracranial Pressure

The classic brain tumor headache—progressive, worse in the morning, and associated with nausea and vomiting—occurs only in a minority of patients who have brain tumors. More than 50% of children who

have brain tumor develop increasingly frequent and severe headaches. Between the headaches, a patient who has a tumor often exhibits other symptoms, such as personality changes, diplopia, ataxia, and gait problems. If unilateral, the headache more often is on the side of the tumor. Nocturnal awakening, although worrisome, is not specific. In addition to specific focal deficits caused by the lesion, one should look for nonlocalizing signs such as sixth nerve palsy and papilledema. Headaches due to increased intracranial pressure may worsen with coughing, micturition, and defecation. Idiopathic intracranial hypertension is a relatively common cause of increased intracranial pressure in adults; in children, it usually is caused by local cranial or systemic disease. Most children do not have any of the characteristic symptoms seen with brain tumors and, therefore, do not require routine imaging studies.

Headache Due to Systemic Disease

An acute headache as a single event can be the beginning of chronic or recurrent headaches, but it is more likely to be due to a systemic disease. Almost any febrile disease can cause headache, but some illnesses characteristically are associated with headaches, including upper respiratory tract infections, sinusitis, otitis media, infectious mononucleosis, and systemic lupus erythematosus. Rarely, a headache may be caused by dental disease, chronic lung disease with carbon dioxide retention, acute and severe hypertension, and temporomandibular joint disease. Conditions requiring urgent and specific management, such as meningitis, subarachnoid hemorrhage, and subdural hematoma, should be investigated.

History

As with most other conditions, the history is the most important part of the evaluation of a child who has headaches. Parents usually are the primary source of information, but discussion with the child and sometimes the teachers may provide useful clues. Noting disparity between

TABLE 4. International Headache Society Diagnostic Criteria for Episodic Tension-type Headache

• Headache lasts 30 min to 7 days
• Headache has at least two of the following characteristics: —Pressing/tightening quality —Mild or moderate intensity —Bilateral location —No aggravation by routine physical activity
• No nausea or vomiting with headache
• Photophobia and phonophobia are absent, or one but not the other is present
• At least 10 previous headache attacks fulfill criteria above. Number of headache days <180/year, <15/month
• Results of the history, physical examination, and neurologic examination do not suggest any underlying organic disease

TABLE 5. International Headache Society Diagnostic Criteria for Chronic Tension-type Headache

• Average headache frequency ≥ 15 days/month (180 days/year) for ≥ 6 months
• Headache has at least two of the following pain characteristics: —Pressing/tightening quality —Mild or moderate intensity —Bilateral location —No aggravation by routine physical activity
• Both of the following: —No vomiting —No more than one of the following: nausea, photophobia, or phonophobia
• Results of the history, physical examination, and neurologic examination do not suggest any underlying organic disease

the parent's and child's story and observation of the interaction between them sometimes can be helpful. A complete description of headaches should include information on length of history, aura, frequency, localization, quality of pain, duration, time of day or days of week, course over weeks or months, associated symptoms, precipitating or aggravating factors, other medical problems, and effect of pain medications on the headaches. In addition, a detailed social history is extremely important in patients who have long-standing headaches. Other neurologic symptoms, such as visual and auditory disturbances, ataxia, focal weakness, seizures, personality changes, and deterioration in school performance, must be investigated.

On the basis of history, headaches can be divided into four major types:

1. Acute (usually due to acute systemic illness)
2. Recurrent (most often due to migraine)
3. Chronic nonprogressive (most often due to tension-type headache)
4. Chronic and progressive (as with a tumor)

Physical Examination

The general physical examination should emphasize blood pressure measurements, auscultation of the head for a bruit (suggesting an arteriovenous malformation), and measurement of head size (for evidence of chronically elevated intracranial

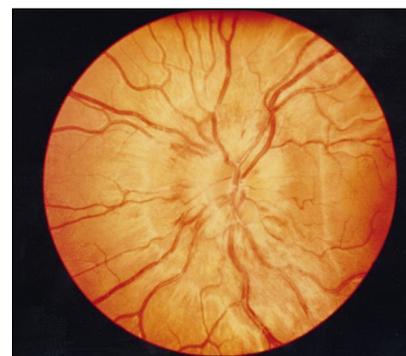


FIGURE 1. Papilledema in a 9-year-old girl who presented with a 2-month history of headaches due to a posterior fossa tumor with secondary hydrocephalus.

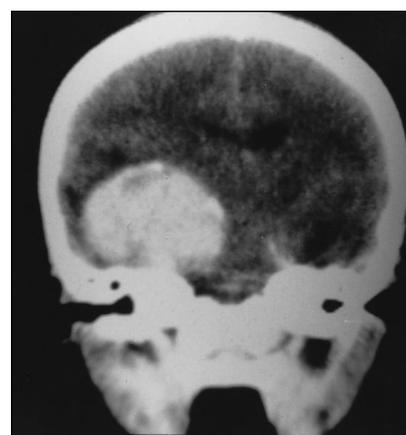


FIGURE 2. Coronal cranial CT scan of a 12-year-old girl who had focal seizures and a 1-month history of headaches shows a large, contrast-enhancing tumor. This ganglioglioma was removed completely and did not recur.

pressure). A detailed neurologic examination should be performed in all patients, including assessment of the mental status and examination of both discs for papilledema (Fig. 1) and, in advanced cases, for secondary optic atrophy. Cranial nerves, motor abilities, gait, deep tendon reflexes, and sensory systems should be evaluated.

Investigations

Most children who have brain tumors have abnormal results on physical examination within 6 months of the onset of headaches. Therefore, children who have chronic or recurrent nonprogressive headaches without any focal signs generally do not need laboratory or radiographic studies. In patients who have chronic

headaches in whom results of neurologic examination are normal, the chances of a computed tomographic (CT) scan demonstrating an abnormality requiring neurosurgical intervention (Fig. 2) is low, and it is unlikely that magnetic resonance imaging (MRI) would have a much higher yield. CT or MRI is indicated in patients who have symptoms of migraine if there is a change in the headache pattern or focal signs or symptoms or if there is a history of seizures, complicated migraines, persistent unilateral headaches, or symptoms of increased intracranial pressure. Patients who have signs and symptoms of increased intracranial pressure but normal findings on MRI should undergo a lumbar puncture to measure intracranial pressure.

Treatment

MIGRAINE

Treatment of migraine can be divided into three categories: 1) general measures, 2) symptomatic management, and 3) prophylactic therapy. In children who have frequent migraines, educating the child and the parents about changes in lifestyle that can lower stress and avoid provoking factors affect the frequency of headache significantly. A headache diary that includes a description of preheadache events can be very helpful in identifying provocative factors. In children who

have mild or infrequent migraines, common analgesics such as acetaminophen or ibuprofen may be effective, particularly if taken early in the headache. Others may require naproxen, metoclopramide, ergotamine preparations, or combinations containing sympathomimetic drugs, sedatives, and analgesics.

Prophylactic treatment is reasonable in children who suffer more than two incapacitating headaches per month or in those who have recurrent complicated migraine. Commonly used prophylactic drugs include amitriptyline, propranolol, and cyproheptadine. They are started at a low dose that gradually is increased until symptoms are controlled or side effects develop. If the patient does not respond to these drugs, verapamil, naproxen, fluoxetine, or sodium valproate may be tried. To determine if the headaches have abated, the medicines can be tapered during a school break, restarting treatment only if headaches return.

Several studies have documented the efficacy of biofeedback and relaxation techniques in children. Finger temperature biofeedback and relaxation techniques can be used as a primary treatment or as an adjunct to medical management.

TENSION-TYPE HEADACHE

Potentially addictive drugs should be avoided for patients who have tension-type headaches. Symptomatic

treatment should begin with acetaminophen, ibuprofen, or naproxen. Antidepressants such as amitriptyline, imipramine, or doxepin are particularly effective in patients who have accompanying symptoms of depression and in those who have overlapping symptoms of migraine and tension-type headaches. Psychological evaluation followed by psychotherapy, relaxation therapy, counseling, and biofeedback are helpful in some patients. Muscle activity biofeedback is particularly useful for some children who experience tension-type headaches.

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PIR QUIZ

13. An 8-year-old girl has had eight episodes of ringing in her ears and right-sided headache within the past year. She describes the pain as pounding. She becomes nauseated and feels exhausted. She gets relief only by sleeping for 2 or 3 hours. Although her hearing is normal when she awakens, her gait is unsteady for up to 1 hour. The *most likely* diagnosis is:
- A. Brain tumor headache.
 - B. Complicated migraine.
 - C. Migraine.
 - D. Migraine with aura.
 - E. Tension-type headache.
14. A 4-year-old boy has had worsening headaches for the past 6 weeks. They now occur daily, especially in the morning when he awakens. He has not attended his morning preschool for the past week and has become disinterested in playing with his friends. He stopped playing his electronic games a few days ago because he keeps “messing up.” The *most likely* diagnosis is:
- A. Brain tumor headache.
 - B. Complicated migraine.
 - C. Migraine.
 - D. Migraine with aura.
 - E. Tension-type headache.
15. An 8-year-old third-grade boy moved to a new neighborhood and new school last month. He has complained of a band-like headache since the second week in his new school. The headaches have increased in intensity and frequency and now occur every morning. For the past 2 nights he has awakened from sleep complaining of pain. He has been practicing to try out for the community junior hockey league but is less confident and more clumsy on the ice than he was a year ago, and his shots are consistently wide to the right. The *most likely* diagnosis is:
- A. Brain tumor headache.
 - B. Complicated migraine.
 - C. Migraine.
 - D. Migraine with aura.
 - E. Tension-type headache.
16. A 16-year-old girl complains of headaches that sometimes cause throbbing in one or both temples or tightness in the back of the head. The headaches last 1 to 2 hours and may be accompanied by dizziness. Ibuprofen and acetaminophen usually provide relief within 2 to 3 minutes, especially if she is able to lie flat on her back. She has had headaches intermittently for more than 1 year. They typically occur almost daily for a week or two and then disappear for a month or longer. She feels fatigued and has difficulty concentrating during periods of headache. The *most likely* diagnosis is:
- A. Brain tumor headache.
 - B. Complicated migraine.
 - C. Migraine.
 - D. Migraine with aura.
 - E. Tension-type headache.
17. The divorced parents of a 13-year-old boy and a 9-year-old girl have been engaged in an acrimonious custody battle over the children for the past 6 months. About 3 months ago the boy began to experience band-like headaches, especially in the morning. He has missed school on three occasions during the past month because of pain and exhaustion. The girl also began to have headaches about 2 months ago. The symptoms are similar to her brother's, but she usually complains of feeling nauseated. Both children appear to have lost weight. There is a strong maternal family history of migraine that includes the mother, grandmother, and an uncle. The paternal family history is significant for astrocytoma in an uncle who died at age 13 years. The *most likely* diagnosis in these two children is:
- A. Brain tumor headache.
 - B. Complicated migraine.
 - C. Migraine.
 - D. Migraine with aura.
 - E. Tension-type headache.

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