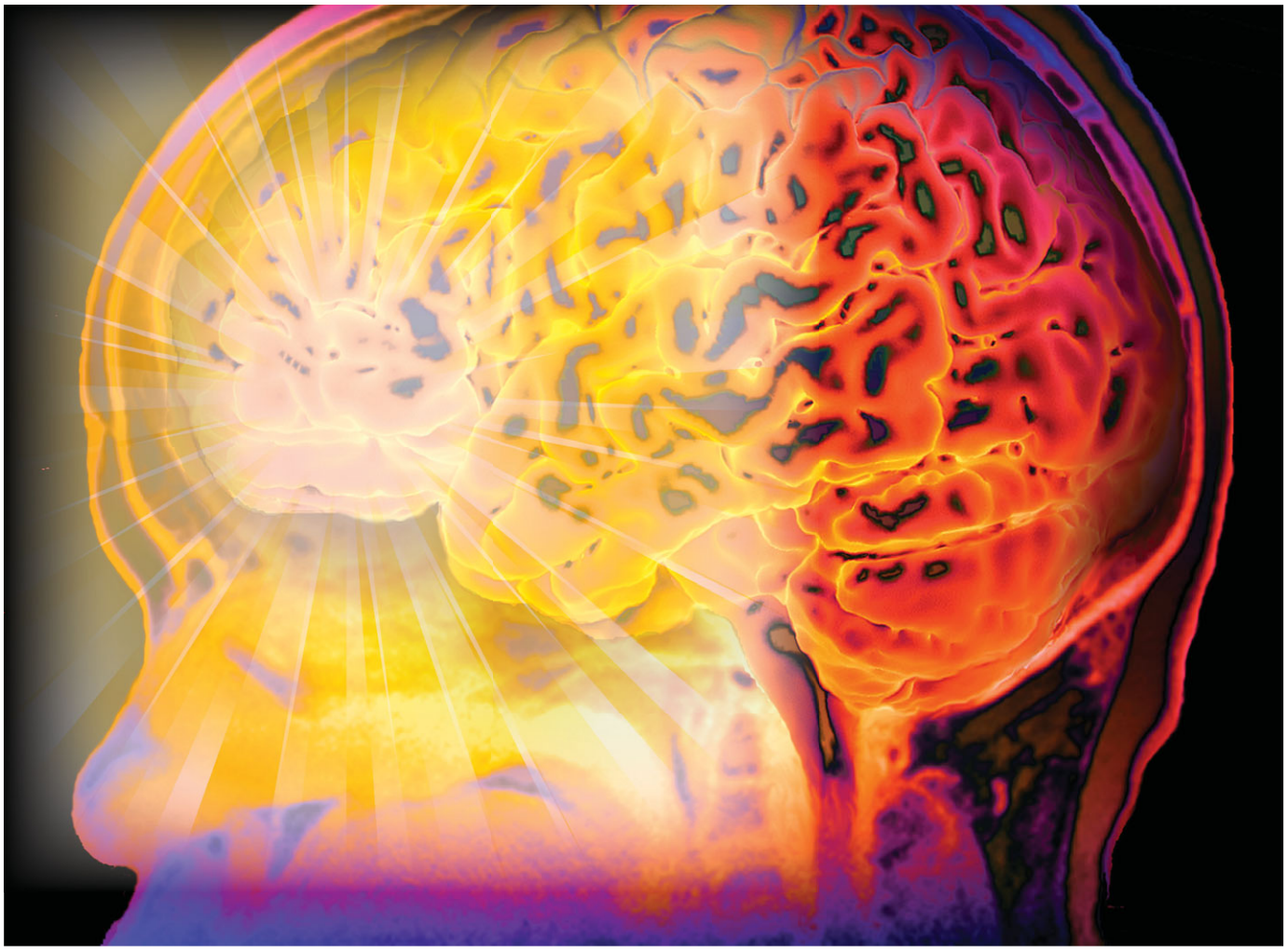

Evaluation and Management of Headache in the Pediatric Patient

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The causes of a child or adolescent's headache can vary and result in primary or secondary headache types. The authors describe how to make an accurate diagnosis and choose the best treatment option for a pediatric patient.

Headache is a common problem in the pediatric population. A significant number of children report having had a headache at some point. About 37% to 51% of elementary school children report a previous episode of headache on initial presentation.[1] By age 15 years, at least 75% of adolescents will have experienced a headache.[2] Of those reporting headache, 2.5% of young elementary school children and 15% of adolescents experience recurring headaches.[3] These headaches often result in significant impairment to a child's quality of life. While headache in pediatric patients results from life-threatening illnesses in only 6% of cases,[1,4,5] it can interfere with a child's academic performance, home life, friendships, leisure activities, and ability to learn. In fact, headache ranks third among illnesses causing missed school days.[6] Yet, even with the high occurrence of headache in the general population, only 1.3 % of pediatric ED visits are specifically for headaches.[2] Patients presenting with a primary concern of headache usually do so only after previous attempts at pain control with over-the-counter medications have failed, they are experiencing a new-onset headache, their usual headache pattern has changed, or they grow frustrated with their recurrent headache symptoms. Often, headache in children is not an isolated complaint but is one part of a larger disease process. The urgent care physician must rule out life-threatening etiologies and provide adequate pain control and symptom relief.

DIFFERENTIAL DIAGNOSIS

Headache in children can usually be separated into several etiologic categories, each with their own symptom pattern. Traditionally, headache is considered either *primary* or *secondary*. Primary headache does not result from any specific cause, such as trauma, infection, or toxic etiology. Secondary headache results from an underlying medical condition. One of the physician's foremost responsibilities is to determine if a patient demonstrates a primary headache, thus likely needing only symptomatic relief, or a secondary headache, which may require a more aggressive workup.

Primary Headache

Migraine, tension, and cluster headaches are all examples of primary headache. Patients with these diagnoses often have a history of recurrent headache and present due to treatment failure or a change in headache pattern; however, patients may also present during their first episode, which challenges the physician to determine whether further workup is required.

Migraine: These headaches are a common complaint in the pediatric population. Estimates of migraine prevalence in childhood and adolescence range from 3% to 10%.[7] Migraine also accounts for 8% to 18% of headaches seen in the pediatric ED.[7,8] During early childhood, more boys than girls experience migraine; by adolescence, there is a female preponderance.[3]

Migraine is classified as *without aura* or *with aura* (Tables 1 and 2).[9] Migraine without aura, or *common migraine*, is the most frequent form, comprising 60% to 85% of pediatric migraines.[3] These headaches usually last 4 to 72 hours. Typically, children complain of headache in a bilateral location, usually in the frontal temporal area. The pain is described as pulsating, with a moderate to severe intensity. These attacks are usually aggravated by physical activity and are often accompanied by nausea, photophobia, and/or phonophobia.[9]

Migraine with aura, or *classic migraine*, typically manifests with episodes of reversible focal neurologic symptoms, which precede a migrainous headache. The neurologic symptoms usually develop over 5 to 20 minutes and last less than 60 minutes. The typical aura consists of visual, sensory, and/or speech symptoms and has a gradual onset. The more frequently described auras include binocular visual impairment with scotoma (77%), distortion or hallucinations (16%), and monocular visual impairment with scotoma (7%).[3] In some instances, the headache following the aura is absent (typical aura without headache) or lacks the features of a migraine headache (typical aura with nonmigraine headache).[3,9]

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Often, headache in children is not an isolated complaint but is one part of a larger disease process.

TABLE 1. International Headache Society Diagnostic Criteria for Pediatric Migraine Without Aura

More than 5 headaches fulfilling features A–C

A. Headache (untreated or successfully treated) lasts 1–72 hours (typically less in children)

B. Headache has at least 2 of the following:
- Either bilateral or unilateral (frontal/temporal) location
- Pulsating or throbbing quality
- Moderate to severe intensity
- Is aggravated by routine physical activities

C. At least 1 of the following accompanies headache:
- Nausea and/or vomiting
- Photophobia and/or phonophobia (may be inferred through behavior)

Adapted from Headache Classification Subcommittee of the International Headache Society.[9]

TABLE 2. International Headache Society Diagnostic Criteria for Pediatric Migraine With Aura

At least 2 episodes fulfilling criteria A–C

A. Aura with at least 1 of the following, but no motor weakness:
- Fully reversible visual symptoms, including positive features (eg, flickering lights, spots, lines) and/or negative features (eg, vision loss)
- Fully reversible sensory symptoms, including positive features (eg, pins and needles) and/or negative features (eg, numbness)
- Fully reversible dysphasic speech disturbance

B. At least 2 of the following:
- Homonymous visual symptoms and/or unilateral sensory symptoms
- At least 1 aura symptom developing gradually over ≥5 min and/or different aura symptoms occurring in succession over ≥5 min
- Each symptom lasting ≥5 but ≤60 min

C. Not attributed to another disorder

Adapted from Headache Classification Subcommittee of the International Headache Society.[9]

Basilar-type migraine represents one variant of migraine with aura. It is seen primarily in young adults but represents approximately 3% to 19% of childhood migraines.[3] The mean age at onset is 7 years. The headaches are preceded by episodes of aura that clearly originate from the brain stem and/or from both hemispheres but lack motor weakness. The aura may consist of dysarthria, vertigo, tinnitus, hypoacousia, diplopia, visual disturbances, ataxia, decreased consciousness, and bilateral paresthesias. Unlike the pain of typical migraine, that of basilar-type migraine can be located occipitally.[9,10]

Familial hemiplegic migraine (FHM) is an uncommon form of migraine with aura that includes motor weakness. Patients with FHM have at least one first- or second-degree relative with the same symptoms. This type of migraine is autosomal dominant and is caused by a mutation in the calcium channel gene *CACNA1A*, which is located on chromosome 19. Typically, the aura has "stroke-like" qualities and may produce some form of hemiparesis. Patients with FHM may also display basilar-type symptoms and almost always have headache. Less common symptoms include disturbances of consciousness, fever, cerebrospinal fluid (CSF) pleocytosis,[9] and confusion during an attack. This type of migraine can also be triggered by head trauma (usually mild), and chronic progressive cerebellar ataxia occurs independently of migraine in about half of families.[9,10]

In addition to the classes of migraine, there are a multitude of childhood periodic syndromes that are considered precursors of migraine. Some children experience cyclic vomiting, recurrent

episodic vomiting, and intense nausea associated with pallor and lethargy; this group often requires medical intervention. The attacks are self-limiting, and patients have complete resolution of symptoms between episodes. *Abdominal migraine* is seen mainly in children, causing episodic, vague, midline or periumbilical abdominal pain lasting 1 to 72 hours. Patients return to their baseline state between episodes. Typically, the pain is severe enough to interfere with normal daily activities.[9] Most children who experience abdominal migraine will develop migraine headache later in life.[9]

While many migraine patients experience pain relief with medication, some patients occasionally find no remittance in symptoms despite taking pain medications. A patient who has had a debilitating, unremitting migraine for more than 72 hours is considered to be in *status migrainosus*, even if he or she has had some relief during sleep or short-lasting relief secondary to medication.[9]

TABLE 3. International Headache Society Diagnostic Criteria for Tension Headache

Infrequent episodes (at least 10 episodes occurring <1 day/month [<12 days/year])

OR

Frequent episodes (at least 10 episodes occurring ≥1 but <15 days/month for at least 3 months [≥12 but <180 days/year])

PLUS

Headache lasting from 30 min–7 days

AND

At least 2 of the following characteristics:

- Bilateral location
- Pressing or tightening quality
- Mild to moderate intensity
- Not aggravated by routine physical activity

AND

Both of the following:

- No nausea or vomiting
- No more than 1 of either photophobia or phonophobia

Adapted from Headache Classification Subcommittee of the International Headache Society.[9]

Tension headache: This is the most frequent type of headache in the pediatric population. The 1-year prevalence rate is roughly 18%, with 5.1% of those aged 14 to 18 years reporting a tension headache.[1,11] Tension headache typically occurs during adolescence and is more common in the female population.

Tension headache is diagnosed only after an extensive history has been taken and a thorough physical exam has been conducted. The physician should determine that the patient is free from other health issues and rule out all other primary headaches (Table 3).[9] Generally, patients describe tension headache as a constant pressing or tightening without pulsation in the scalp muscles, usually over the bilateral temporalis muscle and often extending to the neck and upper back. Younger children may find it difficult to describe the location and quality of the pain. With episodes lasting 30 minutes to 7 days, the pain is described as mild to moderate and less severe than that associated with migraine. Unlike migraine, tension headache is not associated with abdominal pain, nausea, vomiting, vertigo, vision changes, photophobia, or phonophobia. The headache generally does not alter with activity, although 15% of patients have an increase in pain intensity with activity.[1] Triggers of this condition include stress, decreased quality of sleep, poor posture, and stress "letdown" after an emotional event.[12] Tension headache occurs most often on weekdays in the daytime hours and frequently progresses throughout the day. Unlike migraine, tension headache is not associated with familial predilection.[7,11,13]

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Triggers of tension headache include stress, decreased quality of sleep, poor posture, and stress "letdown" after an emotional event.

Cluster headache: Cluster headache is rare in the pediatric population, with a prevalence of

TABLE 4. International Headache Society Diagnostic Criteria for Cluster Headache

At least 5 episodes with a frequency of 1 every other day to 8 per day

PLUS

Severe or very severe unilateral orbital, supraorbital, and/or temporal pain lasting 15–180 min, if untreated

AND

Headache with at least 1 of the following:

- Ipsilateral conjunctival injection and/or lacrimation
- Ipsilateral nasal congestion and/or rhinorrhea
- Ipsilateral eyelid edema
- Ipsilateral forehead and facial sweating
- Ipsilateral miosis and/or ptosis
- A sense of restlessness or agitation

Adapted from Headache Classification Subcommittee of the International Headache Society.[9]

0.09% to 0.1%; it occurs more commonly in boys than girls[13,14] Although the peak age at onset for this condition is 20 to 50 years, these headaches occasionally appear in children; they have even been diagnosed in a 1-year-old.[15] The median age at onset in children is 8.5 years. However, delays in diagnosis due to the unlikelihood of the diagnosis and lack of education about the condition result in a mean age at diagnosis of 11.5 years.[16]

Cluster headache displays a distinct pattern. Patients experience severe, unilateral, retro-orbital, supraorbital, frontal, or temporal pain lasting 15 minutes to 3 hours. Pain usually peaks within 5 minutes of onset and is described as hot, boring, tearing, or burning. The headache occurs simultaneously with at least one symptom of ipsilateral conjunctival injection, lacrimation, nasal congestion, rhinorrhea, eyelid edema, forehead/facial sweating, miosis, ptosis, or a sense of restlessness or agitation. Older patients will often pace due to restlessness. Younger children have emotional outbursts with crying, screaming, and thrashing. Tantrums and even self-mutilation during episodes have been reported. The patient will experience symptom clusters occurring once every other day to eight times per day.[9] Episodes manifest during 6- to 8-week periods, with symptom-free phases lasting 6 months to a year. Occurring at the end of a normal sleep cycle, cluster headache often awakens the patient. There is believed to be a familial connection, with first-degree relatives of patients having a 14-fold increase in risk; however, no association with a family history of migraine has been identified. While many theorize that the headaches arise from involvement of the trigeminal nociceptive pathway, with activation of the parasympathetic cranial system, a definitive cause is not known.[16]

The diagnosis of cluster headache is made purely on clinical grounds (Table 4).[9] Patients who fit the criteria for diagnosis do not require neurologic imaging, although many patients ultimately diagnosed with this condition have had multiple imaging studies during the diagnostic process.

Secondary Headache

Secondary headache has an underlying etiology and often presents as an acute new-onset process due to a variety of causes (Table 5).[1,2,4,13,17,18,19] These are the most commonly occurring headaches in children. In fact, headache due to an upper respiratory infection accounts for 30% of pediatric headaches.[4] Headaches may also represent one of many symptoms in a larger disease process, such as an endocrine disorder or infection. With a more insidious pattern, chronic-progressive headaches often develop over several months and steadily increase in severity (Table 6).[1,2,5,13,17,18] Patients with secondary headache usually present with suspicious findings on history or physical examination, prompting the physician toward further investigation to find the underlying cause of these headaches. As most of these headaches result from a larger disease process, the diagnosis and treatment of these will not be discussed in detail here.

Idiopathic Intracranial Hypertension: One cause of secondary headache that deserves discussion is idiopathic intracranial hypertension (IIH), or *pseudotumor cerebri.* It is seen in 0.9 out of 100,000 ED patients and has a female predominance after puberty.[20] This condition results from an idiopathic rise in intracerebral pressure. Although the exact cause is unknown, IIH is associated with obesity; use of certain medications, such as tetracycline and oral contraceptives; endocrine disorders, such as Addison disease and hypoparathyroidism; malnutrition; vitamin A deficiency and excess; and vitamin D deficiency.[20] Most patients present with a headache that worsens in the morning (often awakening them from sleep) and increases during a Valsalva maneuver. Patients also present with blurry vision, diplopia, transient obscurations, and, as the disease progresses, visual field loss. Other symptoms include nausea and vomiting, ataxia, dizziness, irritability, apathy, and somnolence.[20]

Patients with IIH exhibit certain characteristics upon physical examination. For instance, findings on the neurologic examination are usually normal, except that funduscopy may show papilledema and occasionally retinal hemorrhages. Some patients even present without headache, and IIH is suspected after papilledema is seen during a routine vision examination. Some patients also display localizing signs such as a sixth-nerve or facial nerve palsy. A complete visual field examination is warranted, as vision loss is the best marker of disease progression.

When doing a workup for patients with suspected IIH, the physician must first rule out other life-threatening causes of papilledema. CT of the head determines whether the patient has hydrocephalus, intracranial hemorrhage, or a mass, such as a brain tumor. If CT findings are normal, lumbar puncture should be performed. Results demonstrating an opening pressure greater than 25 cm H_2O with the patient's legs extended or 28 cm H_2O with the patient's legs flexed support the diagnosis of IIH.[21] A patient displaying signs of anxiety should be sedated to ensure an accurate reading. The CSF will not show signs of infection or bleeding. If no other causes of increased

TABLE 5. Causes of Acute Headache

Upper respiratory infection (sinusitis, acute otitis media, pharyngitis)
Dental problems (caries, abscesses, temporomandibular joint pain)
Trauma/Posttrauma
Endocrine disorders (hyperparathyroidism, hypoglycemia, hyperprolactinemia)
Meningitis/encephalitis
Substance abuse (cocaine, methamphetamine, marijuana, caffeine)
Intracranial hemorrhage (arteriovenous malformation, capillary angioma, hemorrhage into tumor)
Toxicology (carbon dioxide, lead)
Subarachnoid hemorrhage
Diet (nitrates, ice cream)
Increased intracranial pressure/brain tumor

Data extracted from Lewis[1]; Kan et al[2]; Conicella et al[4]; Lewis et al[13]; Baren et al[17]; Winner[18]; Brna and Dooley.[19]

TABLE 6. Causes of Chronic Headache

Migraine/tension/cluster	Idiopathic intracranial hypertension
Brain tumor	Brain abscess
Postconcussive syndrome	Brain/Arnold-Chiari malformation
Hydrocephalus	Medication rebound headache
Psychopathology (depression, anxiety, panic attacks, sleep disturbance)	

Data extracted from Lewis[1]; Kan et al[2]; Kabbouche and Linder[5]; Lewis et al[13]; Baren et al[17]; Winner.[18]

TABLE 7. Pertinent Physical Exam Findings

Finding	Possible Meaning
Vital signs	
Temperature	Infectious process
Blood pressure	Increased intracranial pressure
Head	
Head circumference	Hydrocephalus, microcephaly
Vision screening	Asymmetry, recent changes Mass, lesion
Fontanel	Bruit Arteriovenous malformation
Extraocular movements	Cranial nerve abnormalities
Funduscopy	Papilledema
Oropharynx, teeth, neck, tympanic membranes	Infectious process
Neurologic	
Motor asymmetry, ataxia, gait disturbance, change in deep tendon reflexes	Intracranial lesion: tumor, bleeding, abscess
Skin	
Petechiae	Meningitis
Café au lait spots	Neurofibromatosis
Ash leaf spots	Tuberous sclerosis

Data extracted from Lewis[1]; Kan et al[2]; Conicella et al[4]; Lewis et al[13]; Baren et al[17]; Winner[18]; Brna and Dooley.[19]

intracranial pressure are evident, a diagnosis of IIH is appropriate.

To preserve a patient's vision, the physician must aggressively monitor and treat IIH. First-line treatment comprises draining the CSF during the lumbar puncture to maintain a pressure of 15 to 20 cm H_2O. This will relieve the patient's headache. The physician should also consult ophthalmology and pediatric neurology for assistance in monitoring the patient's symptoms and in long-term follow-up. An asymptomatic patient with no vision changes and minimal papilledema requires no further treatment. However, patients with more severe disease may require acetazolamide to decrease CSF production. Patients unresponsive to treatment should receive steroids. Careful follow-up cannot be overemphasized, as 17% of patients ultimately have permanent visual impairment.[20]

EVALUATION OF HEADACHE

A complete physical examination and history are necessary in the evaluation of headache. Abnormalities must not be missed, as they may signal an underlying life-threatening disease. Table 7[1,2,4,13,17,18,19] lists important physical examination findings and their possible significance.

When taking a history, the physician must not use leading questions but should allow the patient and his or her family to describe the pain. The following questions will help distinguish between potentially life-threatening conditions and benign etiologies, as well as help determine the next step in treatment[1,3]: (1) When did the headache begin, and how did it begin? (2) At what time of day does the headache occur? (3) How often does the headache occur, and how long does it last? (4) Do you have more than one type of headache? (5) Where is the pain located, and what is the quality of the pain? (6) Are there any warning signs that a headache is coming? (7) Are there any accompanying symptoms when you get a headache? (8) What makes the headache better or worse? (9) What do you do during a headache? (10) Do headaches happen at any particular time or under certain circumstances? (11) Do you have any symptoms between headaches? (12) Do you have any other health problems? (13) Are you taking any medications? (14) Is there a family history of headaches? (15) What do you think is causing your headache? (16) Does the headache affect school performance? Is development normal, or is there loss of developmental milestones?

Routine screening laboratory tests are not required in the evaluation of pediatric headache; only tests that rule out or confirm a suspected etiology should be performed. For example, a lumbar puncture is required only in children with possible meningitis, subarachnoid hemorrhage, or IIH. To prevent herniation due to loss

of CSF, consider head CT before lumbar puncture when physical examination findings (including papilledema, altered mental status, or focal findings on a complete neurologic examination) suggest increased intracranial pressure. In patients with suspected meningitis who will undergo CT before a lumbar puncture, antibiotics should be administered before the CT to prevent treatment delay.

Most children do not require neuroimaging during the evaluation of their headaches; however certain findings in the history and physical examination should prompt the physician to order imaging tests (Table 8).[2,3,4,17] Ninety-eight percent of central nervous system tumors present with a change that is evident in the neurologic examination; papilledema, ataxia, change in extraocular movements, or abnormal deep tendon reflexes are the most common abnormal findings.[1,17] Therefore, any abnormality in the neurologic examination of headache patients should prompt further testing. Because 95% of patients with secondary headache report pain onset within the previous 2 months, a history of recent progressive headaches should also prompt the physician to consider further evaluation.[4] A higher percentage of children aged 2 to 5 years have a life-threatening cause of headache when compared with older children; thus, imaging should also be considered in these patients. Other reasons for further evaluation include a change in headache pattern, significant increase in headache severity, a history of recent trauma along with signs of increased intracranial pressure, or pain that is occipital, which may indicate cranial pathology. In general, reassuring findings include a recurrent, stable headache pattern, a strong family history of headache, and a normal physical examination.[1,2,4]

TABLE 8. Findings Requiring Further Imaging

Age <5 years
Recent onset with progression within the last 2 months
Abnormal examination findings: papilledema, abnormal extraocular movements, ataxia, hemiparesis, asymmetric deep tendon reflexes
Change in headache type
History of trauma, cancer, immunosuppression with increased intracranial pressure
Unable to describe location, severity, intensity
Thunderclap or "worst headache of life"
Presence of ventriculoperitoneal shunt
Neurocutaneous syndrome

Data extracted from Lewis[1]; Kan et al[2]; Conicella et al[4]; Baren et al.[17]

TABLE 9. Treatment of Acute Primary Headache in Children

Supportive care	Relaxation, decreased noise, darkened room
NSAIDs	
Ibuprofen	10 mg/kg per dose
Ketorolac	0.5 mg/kg per dose
Antiemetics	
Prochlorperazine	0.15 mg/kg per dose (max 10 mg)
Metoclopramide	0.13–0.15 mg/kg per dose (max 10 mg)
Triptans	
Sumatriptan[a]	Intranasal: 5, 10, or 20 mg in one nostril Oral: 25, 50, or 100 mg per dose
Ergot alkaloids	
Dihydroergotamine[b]	0.1–0.2 mg per dose (given with metoclopramide)
Ergotamine tartrate[c]	Sublingual tabs: 2 mg per dose

[a] Supportive efficacy and safety in adolescents but not approved for pediatric use; use only in adolescents age >12 years.
[b] Typically administered on an inpatient basis.
[c] Not currently approved for pediatric use.
Data extracted from Lewis[3]; Kabbouche and Linder[5]; Bailey and McManus[7]; Silver et al.[8]

When neuroimaging is necessary, CT is the best choice for ruling out life-threatening conditions, since it screens for intracranial bleeding, edema, large lesions, and impending herniation—regardless of cause. Brain MRI best determines presence of brain tumors, as well as posterior fossa and brain stem abnormalities such as Arnold-Chiari malformation. However, MRI can present some challenges in the acute setting due to decreased availability and the need for sedation in younger children.

TREATMENT

Treatment of primary headache should focus on adequate pain control (Table 9).[3,5,7,8] Treatment should begin with NSAIDs or acetaminophen. Hämäläinen and colleagues demonstrated a better migraine treatment profile with ibuprofen than with either acetaminophen or placebo.[22] Thus, ibuprofen may be considered a first-line therapy for primary headache. However, as patients usually present after taking over-the-counter medicines without pain resolution, further treatment options are needed. While most guidance on headache management in pediatric patients has been extrapolated from the adult literature, there are multiple treatment options.

If headache resolution is not achieved with ibuprofen or other over-the-counter medications, different treatment options, including alternative NSAIDs, may be used. For instance, Brousseau et al showed that ketorolac improved migraine headache, but only for approximately 55% of the patients who received it.[23] However, ketorolac has also been associated with a 30% recurrence rate within 24 hours of treatment.[23]

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When neuroimaging is necessary, CT is the best choice for ruling out life-threatening conditions.

Antiemetic medications such as prochlorperazine and metoclopramide are also useful in treating pediatric migraine. These medications have been studied extensively in adults, although more studies are beginning to appear in the pediatric literature. Prochlorperazine is more effective than metoclopramide, although both agents are more effective than placebo in aborting a headache. Prochlorperazine is given at a dose of 0.15 mg/kg IV, with a maximum dose of 10 mg. Metoclopramide is dosed at 0.13 to 0.15 mg/kg IV, with a maximum dose of 10 mg. Both agents should be given with an IV fluid bolus.[5] Extrapyramidal effects associated with these medications are seen more frequently in children than in adults but are easily controlled with diphenhydramine. Antiemetics also show better efficacy in headache management than do other classes of medications. For example, in the aforementioned study by Brousseau et al, prochlorperazine outperformed ketorolac, relieving symptoms after 60 minutes in 84.8% of patients compared to only 55.2% of those who received ketorolac.[23] In patients who do not respond, it may be beneficial to use both medications concurrently.[23]

Triptans, while used frequently in the treatment of adult headache, have not been approved by the FDA for use in children. Several trials have been completed in adolescent patients, but data are inconclusive. Nasal sumatriptan has shown some success, due in part to its quick onset of action and ease of administration. Oral triptans are not as efficacious in children as in adults and have not shown an advantage over placebo in relieving headache in pediatric patients.[3] Not enough data exist to support or refute the use of oral triptans for pediatric headache.[3,7,8] Subcutaneous triptans should be avoided, given their lack of efficacy and their invasive method of administration.

Patients may require hospitalization if, after receiving analgesia, they continue to experience chronic severe headache, status migrainosus, or an analgesic rebound headache, despite normal physical examination findings. Often, a patient who has been admitted will be started on a dihydroergotamine protocol. The decision to follow the high- or low-dose protocol will often be made in conjunction with a pediatric neurologist. Although dihydroergotamine provides a decrease in pain in 97% of patients, with 77% achieving complete headache resolution, it may have significant adverse effects, including nausea, vomiting, abdominal discomfort, flushing, and increased blood pressure.[5] Other options for inpatient management of migraine include sodium valproate in conjunction with other medications.[5]

The goals of tension headache treatment include fast relief of symptoms and a quick return to normal activity.[11] In addition to the medications mentioned above, other treatment modalities are effective in achieving these goals. Education in stress management, including relaxation techniques and coping skills, as well as biofeedback, helps many children prevent headaches.[1,24] For patients with depression or anxiety disorders that may aggravate tension headache, treatment of these comorbidities often leads to decreased headache severity and frequency.[25] Overall, the prognosis for tension headache is favorable, with 53% of former pediatric patients reporting complete resolution of these headaches at 20-year follow-up.[6]

Due to the infrequency of cluster headache in young people, treatment of this condition in the pediatric population is extrapolated largely from adult studies. Unlike most forms of primary headache, cluster headache is not relieved by acetaminophen or ibuprofen; however, most patients find relief with the use of high-flow pure oxygen. As many as 70% of patients report cessation of pain within 15 minutes of receiving this treatment via face mask.[14] Intravenous dihydroergotamine, sumatriptan, steroids, and lidocaine nasal spray or drops are also useful treatment modalities during an acute episode. For the most part, preventive treatment of cluster headache is not necessary, as patients typically experience lengthy symptom-free periods; however, patients who must use headache prophylaxis have had varying success with steroids, ergotamine, sumatriptan, lithium, verapamil, and melatonin.[1,14,15]

CONCLUSION

Headache is a common condition in pediatric patients, although relatively few children and adolescents present urgently specifically for this condition. Patients may be diagnosed with a primary headache type, although migraine and tension headache are far more common in children than is cluster headache. More frequently, pediatric patients present with secondary headache with a variety of etiologies, which may be life-threatening in rare cases. Treatment depends on headache cause, and although it is frequently extrapolated from adult data, is typically effective in remediating headache pain in pediatric patients. □

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