"Headaches in Childhood"

A common misconception is that children "shouldn't get headaches" because they do not perceive stress. If a young child complains of a headache, you, as the parent, may fear the worst -- a brain tumor. In fact, headaches are common in children, and while brain tumors may occur in childhood, the period of time from infancy to mid-adult life is when brain tumors are least likely to occur.

Headache presents a great challenge to your doctor, who must decide whether your child's headache is not serious, like the vast majority of headaches, or whether there are signs of greater concern that may require further neurologic testing. Since 80 percent of children will complain of headache to some degree by the time they complete adolescence, this is a frequent reason for referral to a pediatric neurologist.

The vast majority of headaches in childhood can be categorized as either childhood migraine or muscle contraction type headaches. These classifications often overlap, and the underlying cause is often unclear. Although our understanding of the physical basis of headache is poor, current theories and treatment approaches will be discussed in this chapter. The differences between childhood migraine and adult migraine will be emphasized, including associated neurologic symptoms, relationship to certain foods, allergies, and family history of migraine.

Why Children Get Headaches

Nobody really knows why headaches occur. Since almost everyone gets headaches from time to time, it is strange that headaches do not serve any obvious purpose other than to cause discomfort. Certainly, the most common cause of headache is stress. For your child, the everyday pressures of school, schedules, homework, tests, team sports and family activities can be as stressful as the work and career related tensions adults' experience. Children may not have the same coping abilities as adults, and often are overwhelmed by what might appear to a parent to be a secure and stable lifestyle. But unrealized anxieties about Friday's spelling test may be the underlying reason for a weekly headache.

Once headaches become a reoccurring regular event, the headaches themselves often become a major source of stress. The child anticipates a headache, dreads the next episode, and knows it's going to come sooner or later, and sure enough, the "daily monster" shows up. As the cycle progresses, the headaches become more intense, and may interfere with school attendance. Missing school due to headaches further disrupts the child's schedule and feeds into the stress. This negative spiral of...stress...headaches...disrupted activities...more stress...can be very difficult to break.

While stress may be the most common underlying cause of headache, some headaches can be caused by specific factors. Most people have experienced a headache due to low blood sugar resulting from not eating. It may be easy to remedy this type of headache with a glass of orange juice or some other food.
A small percentage of migraine type headaches may be caused by specific foods. This is a much more common cause of headache in adults than children, but if a specific food is the culprit, avoiding that item may solve the problem. I often ask parents to keep a diet history as well as a daily record of headaches. I recall one twelve-year-old girl, whose calendar record showed a headache almost every Friday evening or Saturday morning. Before keeping the record, the headaches were described simply as occurring once or twice a week. After a diet history was added to the daily record, it appeared that her headaches corresponded to eating pizza for lunch every Friday. When this was stopped, the headaches greatly improved. Perhaps this child was sensitive to the cheese in the pizza.

Foods which have been identified as possible headache-causers include aged cheese (such as cheddar, but not plain processed "American cheese"), chocolate, and red grapes (and products made from red grapes including grape juice, grape jelly, and red wines), all of which contain tyramine. Nitrites, which are frequently used as preservatives in meats such as hot dogs and salami, may cause vaso-dilatation (stretching of arteries) which could precipitate a migraine. MSG (monosodium glutamate) is a flavor enhancer containing a high concentration of glutamate, a strong excitatory brain chemical, which is essential for normal brain function, but which, in excess, may trigger headaches. MSG is found in many processed foods, and is often added to Chinese foods, thus leading to the designation of "Chinese dinner headache." While MSG "excites" all taste buds, making anything "tastier," Nutrasweet contains aspartate, which specifically stimulates sweet taste buds on the tongue. Aspartate, like glutamate, is an essential neuro-transmitter chemical in the brain. There have been some reports of headache due to synthetic sweeteners as well, but this is relatively uncommon.

For many parents, chronic complaints of headache from their child raises fears of "the worst"--a brain tumor. It is true that brain tumors can occur in childhood, but while this may be "the worst" cause of headache, it is also the least common cause. Brain tumors account for less than one percent of headaches in children. While there is no single absolute symptom of a brain tumor, it is important to tell your doctor if your child's headaches have been progressively worsening, awakening your child from deep sleep, not responding to medications, or if there is a history of brain tumor in a relative.

**Inheritance of Headaches**

Since headaches are common, it is likely that more than one member of a family may have chronic headaches. Some studies have found that migraine headaches run in families up to 75 percent of the time. Migraines probably can be inherited from generation to generation, but the exact inheritance pattern is not known for sure. Other common factors, such as allergies, diet, and stress may account for headaches occurring in several members of a family.
The Cause of the Pain

It is remarkable that the brain itself actually has no pain sensation. This is why some brain surgery procedures can be performed under local anesthesia, although general anesthesia is usually used to assure that the patient does not move during the surgery. Where then does the pain of a headache come from? While the exact source of pain is not entirely known, the pain clearly must come from pain sensitive structures of the head. These include

the membranes surrounding the brain, called the meninges, the walls of the arteries supplying blood to the brain and scalp, and the muscles of the scalp which insert on the hard bony surface of the skull.

Meningitis is an infection of the meninges, which accounts for the frequent complain of headache in cases of meningitis. While meningitis is a relatively unlikely cause of headache, it must be considered if other symptoms, such as fever and stiff neck are present. (This is discussed in another chapter of this book.)

Muscle contraction headaches, sometimes called muscle tension, or stress headaches, are certainly the most common type of headaches. The pain is due to sustained contraction of muscles in the frontal, temporal (side), or back (occipital) parts of the head. As the frontalis or temporalis muscles of the scalp tighten, they become tender from their swollen state, and as they pull taut on the periosteum, the surface of the skull bone, additional pain occurs.

Thus, while the brain may be insensitive to pain, it is surrounded by many highly pain-sensitive structures, including the meninges membranes, arteries, the skull bones, and the scalp muscles. The characteristics of headaches may differ depending on which structures are causing the pain.

Migraine Headaches

Migraine headaches can be attributed to stretching and throbbing of arteries in the scalp and brain, whereas, the tight, "as though a vice were squeezing the head," aching pain of a muscle contraction headache is due to traction of the scalp muscles on the skull bones. Migraines may be localized on one side of the head, and many people can point to one particular spot on their head which is the "focus" of pain. This location may correspond to a particular artery that is causing the greatest pain.

In addition to the nature of the pain, other symptoms may help to differentiate different types of headaches. Common muscle contraction headaches may occur without any symptoms other than the pain, although sometimes they may be severe enough to cause nausea and vomiting. Migraines are much more likely to be associated with additional symptoms, especially nausea, vomiting, and visual disturbances. A child with migraine may complain of seeing spots, either white dots or colored spots, loss of peripheral vision ("tunnel vision"), blurred vision, or even double vision. Usually these symptoms occur in the first few minutes of the migraine, and
resolve after fifteen to thirty minutes. In some children, but more commonly in adults, visual disturbances will precede the headache by twenty or thirty minutes. When this happens it is called an aura, one of the hallmarks of a "classic" migraine attack.

Some especially severe migraines may cause more dramatic symptoms of neurologic deficit. These may include partial loss of vision, weakness of one side of the body, numbness and tingling, and mental confusion. These symptoms are uncommon in young children, but certainly occur in teenagers and adults. Neurologists may refer to "complex migraines" or "migraine equivalents" when severe neurologic symptoms are present. These symptoms are thought to be due to severe spasm in arteries in the early phase of the migraine. This results in reduced blood flow to part of the brain, which may cause specific neurologic deficits. As the migraine progresses, the spasm releases, leading to painful throbbing and stretching of the artery. In extremely rare cases, and almost never in children or adolescents, the arterial spasm can last long enough to cause permanent injury to the brain -- a stroke. Strokes due to migraine usually involve spasm of the basilar artery, the artery that comes up the back of the neck to the base of the brain. Parents should not be unduly frightened by these severe consequences of headache. They are mentioned here to provide a complete discussion and to reassure parents that serious causes and consequences of headaches in children are quite rare.

**When To Call The Doctor**

Although most headaches do not require medical attention, parents do need to know when it is important to call your doctor. Severe headaches in a child who rarely complains of headache should be evaluated. Headaches which awaken a child out of sleep are unusual, although migraines can sometimes do this. Headaches associated with severe vomiting or dehydration should be checked by a doctor.

In addition to acute headaches which may require urgent evaluation, headaches which are reoccurring regularly probably deserve your physician's assessment. If a young child, under the age of eight, frequently complains of headache, it may be time to consult your pediatrician. Certainly, any child who suffers one or more headaches per week should be evaluated to determine the cause of the headache and a plan of treatment. Frequent school absence due to headache is another substantial reason to have your child seen.

**What Your Doctor Will Do**

Your doctor can help. I tell my patients that all headaches get better -- it's just a matter of how much better and how quickly. The medical evaluation of headaches begins with a careful history of the problem. It may be very helpful to anticipate the questions your doctor will ask. Neurologists need to know very specific characteristics of the headaches in order to determine the cause, the need for further testing, and the appropriate treatment. The questions the neurologist will ask you will categorize the headaches in terms of the severity and type of pain, the location on the head, and the frequency. Any pattern of occurrence should be noted. Do the headaches occur more often in morning or evening; more on weekdays or weekends?
Associated symptoms such as nausea, vomiting, or any disturbance of vision are important markers of migraine headaches. If there is any relationship between headaches and a child's diet, it may suggest a trial of avoiding certain foods.

Your doctor will ask you whether there is any family history of headaches or migraines in relatives, and whether they take medication for their headaches.

**Medical Tests Which May be Helpful**

Stress or tension headaches do not cause abnormalities on any neurologic tests. Scans of the brain, such as CT scans and MRI scans may be performed if your doctor is concerned about symptoms which suggest an abnormality of the brain. As we discussed, brain tumors and brain hemorrhages are rare causes of headache, but MRI and CT scans are used to diagnose these problems. A normal scan can be very reassuring to you and your doctor, but certainly it is not appropriate to do a brain scan for every headache. A scan may be appropriate if the headaches are unusually severe or frequent, or if they awaken a child out of sleep, or if a child does not improve after treatment with the usual medications. Certainly a scan should be done if your doctor finds a problem in the neurological examination.

Another test which may be helpful is the EEG (electroencephalogram). This test does not provide a "picture" of the brain as an MRI or CT scan does, but rather, it provides information about how the brain is functioning. Abnormalities may be present on an EEG in patients with migraine headaches, because effects on blood flow to the brain may cause a change in the electrical activity of the brain. Studies of brain electrical activity during a migraine have shown "waves" of rhythmic activity traveling across the surface of the brain during a migraine. The exact role that this plays in a migraine is not known. However, if an EEG shows irregularity of the "brain waves," it would support the diagnosis of migraine.

EEG's may also be abnormal in other conditions which may cause headache. Head injuries, such as concussion, may cause a slowing of the normal electrical activity. Tumors or other masses in the brain may affect brain electrical activity.

The EEG test is painless and has no possible side effects. The test is merely measuring electrical activity produced by the brain, and does not send any electricity into the body. It may be likened to an electrocardiogram (EKG) which measures the electrical activity of the heart, except that EEG measures brain activity. The test is performed by pasting small metal cups (electrodes) on the scalp. These cups sense electrical activity from the brain and transmit the signals to an amplifier. The machine then traces a line on moving paper which gives a visual picture of the electrical voltage produced by the brain.

Lumbar puncture (LP) is a medical procedure performed to obtain spinal fluid, most commonly to diagnosis an infection called meningitis, but sometimes performed if bleeding (subarachnoid hemorrhage) is suspected as a cause of headache. While infections of many sorts, including meningitis, can cause headache, post-lumbar puncture headache is quite common after this
procedure. It is thought that headache occurs due to a decrease in the normal spinal fluid pressure after some fluid is removed, and particularly as some fluid continues to leak out through the opening made by the needle puncture. This headache is readily recognized by the fact that it quickly improves when the child lies flat in bed. The headache usually resolves in one or two days.

**Treating Headaches**

When headaches are severe, recurring, or complicated by neurological symptoms, they cannot be ignored, and it is time to seek help from your doctor. It is important to understand that there is no perfect treatment for headaches, and reasonable expectations are crucial if you are to avoid the frustration of only achieving partial improvement. If we had the perfect cure, no one would ever suffer from headaches.

Choosing the best approach to treatment for headaches is dependent on the severity and frequency of headaches, as well as the cause. Mild, infrequent headaches often respond to lying down, relaxation, and a change of environment. A school age child may only need a half-hour’s rest in the nurse’s office before returning to class. Scalp massage with the finger tips may be very effective in relieving muscle contraction type headaches. This is often best performed by the child, who can then gauge where to apply the pressure. Other times, a child will respond well to a parent’s massage technique. An ice pack applied to the scalp over the area of greatest pain may be helpful as well. This can reduce swelling and soreness in scalp muscles, and reduce throbbing and stretching of scalp arteries.

Pain management techniques may also be useful, even in young children, particularly in the management of stress induced headaches. A child may be read a story, or instructed to imagine a particularly enjoyable experience, or be engaged in a relaxing game or project with a parent. Sometimes a stressful source of the headache is clearly evident, such as a heavy load of school work. The headache may improve dramatically, when the child is helped by a parent to get organized, set priorities, and set up a timetable for getting the work done. When the child is not feeling so overwhelmed, the headache may improve.

**Headache Medications**

Pain medications are often the first approach to treating headaches, because they can be very effective, they work quickly, and usually have little side effects. Common over-the-counter medications, which do not require a doctor’s prescription, include aspirin, acetaminophen (Tylenolâ±), and ibuprofen (Advilâ±, Motrinâ±). A new non-prescription strength analgesic pain medication, similar to ibuprofen, is naproxen (Aleveâ±).

In general, aspirin is not recommended for children, primarily because of concern about the role of aspirin in causing Reye Syndrome, a severe liver disorder. In addition, aspirin can cause gastritis, upsetting the stomach. Gastritis may also result from the use of ibuprofen and naproxen.
Acetaminophen is probably the most effective pain medicine with the least potential side effects. While over-use of acetaminophen may result in liver damage, this should not be a concern when the standard recommended dose is used. Headaches may improve within 20-30 minutes after a dosage of acetaminophen. If the headache persists, the medication can be repeated up to every four hours. Acetaminophen is available in 80 mg. baby tablets, 160 mg. junior strength tablets, 325 mg. regular adult tablets, 500 mg. extra strength tablets, and 80 mg. per teaspoon liquid.

When acetaminophen is ineffective, ibuprofen may be tried. Because ibuprofen has anti-inflammatory effects as well as analgesic (pain-blocking) effects, it may be more effective for migraine headaches in which arteries may be throbbing and inflamed. Most brands of ibuprofen have a coated tablet which helps to reduce irritation of the stomach, and facilitates easy swallowing. The standard dose is a 200 mg. tablet. A liquid formulation (Pediprofenâ ) is available for younger children, or anyone who has difficulty swallowing the tablet.

**Prescription Medications**

There is a wide range of pain medications available by prescription. After a thorough evaluation, your doctor may suggest analgesic medications which are stronger than over-the-counter medication. While stronger pain medications may be effective, the potential for risks of side effects and overuse must be considered. For this reason, prescription medications must be used responsibly and monitored carefully. A follow-up visit with your doctor after a four to six week trial period of medication use is important to be sure the medication is effective and there are no side effects. Analgesic medications can cause drowsiness if the dose is too high or if a child is sensitive to a particular medication. The choice of medication is ultimately up to your doctor, but the following is a brief description of some of the more commonly prescribed pain medications for headache.

Combination medications(Fiorinolâ , Fioricetâ )contain several ingredients (aspirin, in Fiorinolâ , or acetaminophen, in Fioricetâ , plus caffeine and butalbital) which work together to reduce pain, and are generally more effective than plain aspirin or acetaminophen. Codeine may be combined with acetaminophen to provide a significantly enhanced level of pain relief. However, codeine may be habit forming, and often causes nausea. In general, it is best to avoid codeine containing medications in children. Many other prescription medications are available from your doctor which can be effective for migraine headaches, with relatively little risk of side effects.

**Preventative Medications**

Unlike analgesic medications which are taken after the headache has begun, preventative medications are designed to prevent the onset of the headache. These medications are most effective for migraine type headaches, and must be taken daily, whether or not a headache occurs. Once a level of medication is maintained in the bloodstream, recurring headaches will become less frequent and less severe. It may take a week or two before improvement begins.
Many patients get frustrated when they do not see improvement in the first two weeks of treatment, and may discontinue the medication just at the point when it was about to start working. It is very important to continue your medication, because even if you miss a few days, it may take another week or ten days to build up an effective level again.

Daily preventative medications should only be considered if the headaches are occurring frequently enough to justify a daily medication. I consider weekly headaches frequent enough to consider a preventative medication, particularly if the headaches are long lasting, interfere with school or other activities, or are associated with neurologic symptoms. The decision to use a daily medication for a child's headaches must be made after a thorough discussion of the alternatives, and with the agreement of your doctor, your child, and you, the parent.

The most commonly used preventative medication for migraine is propranolol (Inderal®), a medication originally developed for treatment of high blood pressure. Propranolol is thought to block headaches by preventing spasm in arteries, and by blocking a chemical in the bloodstream called serotonin, which may be involved in triggering headaches. Propranolol should not be used in children with a history of asthma and allergies, since it can cause respiratory difficulty and bronchospasm. Cyproheptadine (Periactin®) also is a serotonin blocker, but has antihistamine effects, which can be beneficial in children with allergies. Cyproheptadine is a good choice if a preventative medication is to be tried since it has few serious side effects. It may cause drowsiness, due to the antihistamine effect, but this can be overcome by taking the medication at bedtime. Some patients have reported increased appetite due to cyproheptadine, but this is relatively uncommon in children. Other preventative medications which have been found to be effective include amitriptyline (Elavil®), which helps to relax muscles and stabilize neurotransmitters in the brain, and calcium channel blocking medications, which help to prevent spasm in blood vessels. Whichever medication you and your doctor choose, be sure that you understand how the medication is expected to work, and what side effects may occur. Continued monitoring of your child's symptoms by your doctor is essential in order to decide when the medication should be discontinued.

Recently, an additional group of medications have been used to treat severe, acute vascular (migraine) headaches. While these medications are available primarily for adults, they may be considered for older teenagers after appropriate medical evaluation. Sumatriptan (Imitrex®, Zomig®), dihydroergotamine (DHE®), and prochlorperazine (Compazine®) have all been found to be effective in treating major headache attacks when given by injection. These medications are mentioned here in order to provide a complete discussion, but they should not be considered routine treatment in children. Use of these medications should be determined by your doctor depending on the individual circumstances.

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