

Chapter 132

Secondary Headaches in the Pediatric Population

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Many parents who bring their children to medical attention with a complaint of headache are not merely seeking relief of the troublesome symptom of pain. They are worried that their child may have some serious intracranial disease, and in particular they are often worried about the possibility of a brain tumor. In the majority of cases these worries are unfounded. Most serious secondary headaches do not present with headache alone but with additional symptoms and physical signs that make the nature of the problem quite clear.

Headache is a common symptom in children and about two thirds of children will report that they have had headache in the past year (2). In only one third of these cases is the headache severe enough to interfere with normal activities, and the majority of these children will have migraine (2). In a large epidemiologic study, clinical interview and examination of the children with severe headache did not reveal a single serious underlying disorder that may have been missed (2). Similarly, a hospital-based study looking at children presenting to an emergency service with headache showed no children with brain tumor or bacterial meningitis in whom headache was the presenting complaint (3). A hospital clinic series of 800 children and adolescents found that only three children (0.375%) had significant neurologic cause for their headaches, and only one child (0.125%) had an unexpected diagnosis of brain tumor (1). Despite this, headache can occasionally be one of the symptoms of serious underlying pathology, and all children who present with headache must be carefully evaluated. This applies even in children in whom the diagnosis seems obvious from the clinical history, as there may be unexpected clinical findings on examination.

CEREBRAL TUMOR

International Headache Society (IHS) code and diagnosis: 7.4 Headache attributed to intracranial neoplasm

World Health Organization (WHO) code: G44.822

Children and their parents seeking medical help for headaches are often worried about the possibility of a brain tumor being present. Intracranial tumors are the second most common type of neoplasm in childhood and the most common solid tumors. The incidence is 2.4 per 100,000 in children younger than 15 years (5). When a brain tumor causes a headache, it is usually secondary to increased intracranial pressure, which may be due to the mass itself or a result of obstruction of cerebrospinal fluid (CSF) flow. The headache pattern is usually chronic and progressive and increases in frequency and severity over time. Increased intracranial pressure may cause symptoms that can be confused with migraine (Chapter 43). The headaches tend to be worse in the morning and are often accompanied by vomiting. The pain is usually intermittent and in some patients may be throbbing, although it is usually dull and steady. The pain is exacerbated by coughing, straining, or lying down. Third- or sixth-nerve palsies may cause strabismus, but children may have difficulty describing diplopia and this may be confused with the visual aura of migraine. The majority of cerebral tumors in children are located in the posterior fossa and in these, dizziness is a common complaint. This too may be accepted as a manifestation of migraine.

It may be difficult to detect signs of a cerebral tumor if the patient presents with a very short history of headache. The diagnosis can be suspected in certain genetic

syndromes, such as neurofibromatosis, and in those who have symptoms other than headache alone, including seizures, ataxia, weakness, visual abnormalities, and personality change. Children with cerebral tumors may have psychologic changes including behavioral problems, depression, apathy, inattentiveness or other problems at school, and slowing of intellectual development. If the history is of any significant length, the neurologic examination is almost always abnormal. Chronic or frequent headache is present in 62% of children with brain tumors before their first hospitalization (5). However, when headache is a presenting complaint in a child with a brain tumor, the child is likely to have at least one other symptom and one or more neurologic signs regardless of tumor location. Less than 1% of children with headache and brain tumor have no other symptoms. More than half of children with headache and brain tumor exhibit five or more neurologic deficits (5).

Careful neurologic examination is therefore required and must include examination of the optic fundi and of eye movements as well as other cranial nerves and the motor system in general, with emphasis on coordination. Increased intracranial pressure may also be associated with systemic hypertension or with bradycardia.

As delayed diagnosis or missing a cerebral tumor may have serious consequences, any child presenting with headache who is found to have positive neurologic signs on clinical examination requires neuroimaging. It is probably better to overinvestigate if there is any suspicion of cerebral tumor (8).

BENIGN INTRACRANIAL HYPERTENSION (PSEUDOTUMOR CEREBRI)

IHS code and diagnosis: 7.1.1 Headache attributed to idiopathic intracranial hypertension (IIH)
WHO code: G44.820

This is a condition in which there is increased intracranial pressure that may mimic the symptoms of brain tumor but where there is no evidence of tumor. The anatomy of the ventricular system and CSF are normal. Benign intracranial hypertension may be associated rarely with a wide variety of diseases, but the most common association is with obesity (12). The condition is rare. An annual incidence of symptomatic disease of 0.9 per 100,000 children was reported from Nova Scotia with a 2.7-fold female preponderance (9).

The typical patient with benign intracranial hypertension is an alert, conscious patient without localized clinical signs but with clinical features of increased intracranial pressure. The most common symptom is

headache, although this is not always present in every patient (7). Other neurologic symptoms may be present. The main clinical finding on examination is bilateral papilledema, but this may occasionally be absent (7,11).

Neuroimaging is mandatory in any child with headache and papilledema, and until this has been performed, the diagnosis cannot be adequately made. A lumbar puncture must be performed and CSF pressure should be in excess of 150 mm of water.

There have been no randomized controlled trials of management. Current management approaches are discussed in Chapter 114.

The prognosis of benign intracranial hypertension is variable, with some patients recovering spontaneously after only a few days while others continue to have symptoms for many years. The main complication is that a proportion of children will develop visual impairment.

HEADACHE SECONDARY TO INFECTION

IHS codes and diagnoses:

- 9.2.2 Headache attributed to systemic viral infection (**WHO code:** G44.881)
- 9.1.2 Headache attributed to lymphocytic meningitis (**WHO code:** G44.821)
- 9.1.1 Headache attributed to bacterial meningitis (**WHO code:** G44.821)
- 9.1.3 Headache attributed to encephalitis (**WHO code:** G44.821)
- 9.1.4 Headache attributed to brain abscess (**WHO code:** G44.821)
- 11.5 Headache attributed to rhinosinusitis (**WHO code:** G44.845)
- 11.6 Headache attributed to disorder of teeth, jaws, or related structures (**WHO code:** G44.846)

Headache associated with fever is almost always associated with infection. Headache is a common feature of the febrile illnesses of childhood and most are not of serious significance. Headache is one of the principal symptoms of many viral infections and during outbreaks of these, the diagnosis is usually obvious. In other cases it is usually impossible to make a precise etiologic diagnosis, and investigation is seldom indicated as most of these infections are self-limiting.

Some of the infections may, however, be more severe. In one emergency department study 5% of children presenting with severe headache had viral meningitis. Meningitis is a major worry of parents bringing their children to the emergency service with acute headache, and although

headache is a feature of nearly all children with meningitis, they will usually have other signs of meningeal irritation. If these signs are found, a lumbar puncture is indicated to establish the diagnosis.

Tuberculous meningitis is rare, and in most instances the onset is insidious and symptoms are nonspecific. It is a complication of primary tuberculosis with or without milary spread. On occasion, headache may initially be the only significant symptom, perhaps accompanied by slight mood swing. After 1 or 2 weeks further symptoms will become apparent.

Encephalitis is an inflammatory process of the cerebral parenchyma of infectious cause. Viruses are frequently the causal agents, and this is one of the most serious life-threatening diseases of children and adolescents. Most patients will complain of headache, but this is only one of a constellation of symptoms.

Patients with brain abscess will typically present with headache, fever, and neurologic deficit. There is frequently some predisposing factor. In the early stages of the infection clinical features may be nonspecific with no clear indication of intracranial pathology. With time, this evidence will appear with symptoms of headache, vomiting, convulsions, and altered consciousness. There may be localizing unilateral neurologic signs, and papilledema may develop. Blood culture is seldom positive but there may be an acute phase reaction suggestive of bacterial infection. The diagnosis is based on neuroimaging.

Headache may also result from extracranial infections involving other structures in the head and neck. The most common of these is sinusitis. In the early years inflammation is confined to the maxillary antra and ethmoids, as the frontal sinuses have not yet developed. In many cases sinusitis is associated with respiratory tract allergy, which produces underlying drainage problems. The symptoms may include purulent nasal discharge, poorly localized headache, and low-grade fever.

Often the clinical picture is vague, leading to diagnostic difficulty. Investigation may include direct endoscopy and tomography as well as standard radiographs. Sinusitis may be detected as an incidental finding when cerebral imaging is performed for intractable headache. Occasionally, sinusitis is associated with intracranial spread, resulting in abscess formation and meningitis. Recent studies have suggested that sinusitis may be overdiagnosed in children and that many children whose headaches were initially thought to be related to sinusitis have in fact one of the primary headache syndromes such as migraine (13).

Dental abscess may be described as headache by young children who have difficulty localizing the site of pain. This may cause confusion and diagnostic delay, and it is worthwhile to check the teeth particularly of younger children presenting with acute headache.

HEADACHE ASSOCIATED WITH CONSTIPATION

There appears to be an association between constipation in children and headaches that are indistinguishable clinically from tension-type headache (14), which may be episodic or may become chronic, without pericranial tenderness. Constipation is not listed as a cause of headache in the IHS classification.

Constipation should be suspected where the headache is associated with symptoms such as abdominal pain or nausea. Many children and adolescents will deny constipation and some even complain of diarrhea, which is a symptom of constipation with overflow. Most parents of school-age children are not aware of their child’s bowel habits. Constipation may be confirmed on abdominal examination by the finding of palpable rocks of feces, or by observing loaded bowel on a plain abdominal radiograph. In many patients the headache resolves if the constipation is treated with laxatives. Treatment should be continued for several months until normal bowel habit is restored and may then be gradually withdrawn but not abruptly stopped.

HEADACHE ASSOCIATED WITH SUBSTANCES AND THEIR WITHDRAWAL

Analgesic-Overuse Headache

IHS code and diagnosis: 8.2.3 Analgesic-overuse headache
WHO code: G44.410

Analgesic-overuse headache, sometimes called rebound headache, occurs when symptoms are aggravated by headache treatment. The headache occurs daily or almost daily and should be suspected in any child with a history of headache on 4 or more days per week. In children analgesic-overuse headache may be induced by mild analgesics such as paracetamol or ibuprofen used alone (15). This is different from the pattern in adults, in whom overuse of single preparations is rare, but this probably reflects the adult pattern of drug use rather than a necessity for the development of analgesic-overuse headache. However, analgesic-overuse headaches are said to be more common in patients who use combination preparations of an analgesic with other drugs, such as caffeine or codeine. In some cases the headache may be caused by excessive use of the nonanalgesic drug in the compound, particularly caffeine. Many children and their parents do not consider the use of nonprescription analgesics to represent drug therapy and may deny that any drug therapy has been given (15). It is important to make specific inquiry regarding the

use of nonprescription drugs. The analgesic drugs are usually taken for every headache and may be repeated several times daily. In many children the drugs do not help the headache symptoms but are given by the parents because they feel they cannot leave their child in pain without giving medication.

Triptan-overuse headache has not been reported in children; this is probably because these drugs have, until recently, not been licensed for use in childhood. It seems likely that triptan-overuse headache may be seen as use of these drugs in children increases.

A typical child with analgesic-overuse headache presents with a history initially of infrequent headaches, which can be of any headache type. Migraine and tension-type headache are commonly described, but the condition may also present after posttraumatic headache. The headaches then become increasingly frequent until they occur on most days.

Analgesic-overuse headache in children is probably uncommon, but there is no published information on its prevalence. The condition, however, is important, as it results in considerable disability for those affected.

The treatment of analgesic-overuse headache is complete withdrawal of all analgesic medications (15,17). This may be done on an outpatient basis. There is no need to prescribe alternative medication in children, and patients should be advised not to substitute alternative analgesics. They should be warned that symptoms may initially worsen for several weeks before headaches generally become less frequent. The short-term prognosis is good (15–17), but some patients may relapse and return to excessive analgesic use.

Caffeine-Related Headaches

IHS codes and diagnoses:

8.2.6 Headache attributed to other medication overuse
(WHO code: G44.410)

8.4.1 Caffeine-Withdrawal headache
(WHO code: G44.83)

Excessive consumption of caffeine on a regular basis may cause a chronic headache that initially resembles a chronic tension-type headache. In children the ingestion of caffeine is often in cola drinks (10), and coffee is seldom implicated. Withdrawal from periods of excessive caffeine consumption may also produce headache (6).

Solvent Abuse

Organic solvent abuse (glue sniffing) is commonly seen in adolescents. After such abuse there may be symptoms similar to those of a postalcoholic hangover. These include

headache, vomiting, and malaise, and may come to medical attention as suspected intracranial pathology. Solvent abuse is often denied by the patient but can be suspected if there are skin lesions around the mouth and nose or unusual odors on the breath or skin.

CARBON MONOXIDE POISONING

IHS code and diagnosis: 8.1.3 Carbon monoxide–induced headache
WHO code: G44.402

Carbon monoxide poisoning is an uncommon but very dangerous cause of headache in children. The clinical symptoms vary with different levels of exposure. At low-level exposure the symptoms are of a dull, generalized, and often occipital headache. As the concentration of gas increases the intensity of head pain also increases and there may be nausea, vomiting, and confusion. Higher concentrations may cause death.

The most common cause of carbon monoxide poisoning is faulty or inadequately maintained gas heating or cooking appliances used in poorly ventilated spaces. Slow leaks of carbon monoxide may produce low-level headaches in family members.

Patients suspected of carbon monoxide poisoning should be instructed to have all gas appliances checked by an engineer and to check each room in the house using a carbon monoxide meter. It is not adequate to check a blood carboxyhemoglobin level in the outpatient clinic because blood levels decline rapidly when the patient is removed from exposure.

HYPERTENSION

IHS code and diagnosis: 10.3 Headache attributed to arterial hypertension
WHO code: G44.813

There is debate as to whether hypertension causes headache or whether the condition is asymptomatic and headache represents a coincidental finding. However, it is believed that hypertension may rarely be responsible for childhood headaches. The headache associated with hypertension is reported to be worse early in the morning and to improve during the course of the day. It is throbbing and bilateral and easily confused with migraine. In children, hypertension is most often secondary to renal disease, but may also be associated with other conditions. Although uncommon in children, hypertension is an important and dangerous condition, and blood pressure should be measured routinely in every child who presents with headache.

OCULAR HEADACHES

IHS codes and diagnoses:

- 11.3.2 Headache attributed to refractive errors
- 11.3.4 Headache attributed to ocular inflammatory disorder

WHO code: G44.843

Most children with headache have been examined by an optometrist before they reach a pediatric or neurology clinic. There is a wide belief in the general population that headaches commonly result from ocular causes. In practice this is seldom the case (4) and in most cases no abnormality has been found. Even when refractive errors are uncovered, in many patients their correction has no therapeutic effect on the headache. However, on occasion untreated strabismus, astigmatism, and simple refractive errors are believed to be responsible for headache. The painful red eye of acute uveitis may occasionally present as headache and requires urgent referral to an ophthalmologist.

POSTTRAUMATIC HEADACHE

This term is used to describe headaches that follow trauma and are not otherwise classifiable. In many cases minor head injuries trigger pre-existing headache syndromes, especially migraine, and in such cases trauma should be regarded as a trigger factor rather than the cause of the headache. Many patients and their parents like to attribute the onset of the headaches to some event in the child’s life and head injuries are easily remembered. In many cases the relationship between the head injury and the headache may be coincidental.

Acute Posttraumatic Headache

IHS code and diagnosis: 5.1 Acute posttraumatic headache

WHO code: G44.880

It is not surprising that injury to the head is often associated with pain. It is usually obvious that the injury is

TABLE 132-1 Vascular Disorders

	IHS Code	WHO Code	IHS Diagnosis	Comments
Intracranial hematoma				Much rarer in children than in adults
	5.5	G44.88	Headache attributed to traumatic intracranial hematoma	
	5.5.1	G44.88	Headache attributed to epidural hematoma	
	5.5.2	G44.88	Headache attributed to subdural hematoma—acute, subacute, and chronic	
Cerebral ischemia				Rare in children Thrombi may be of cardiac origin
	6.1.1	G44.810	Headache attributed to ischemic stroke	
	6.1.2	G44.810	Headache attributed to transient ischemic attack	
Intracranial hemorrhage				Rare in children Similar symptoms to adults
	6.2.1	G44.810	Headache attributed to intracerebral hemorrhage	
	6.2.2	G44.810	Headache attributed to subarachnoid hemorrhage	
Miscellaneous				
	6.5.1	G44.810	Headache or facial or neck pain attributed to arterial dissection	May follow trauma to the posterior pharynx
	6.5.5	G44.810	Angiography headache	
	6.6	G44.810	Headache attributed to cerebral venous thrombosis	
	6.7.2	G44.81	Headache attributed to MELAS	Attacks resemble complicated migraine attacks
	6.7.4	G44.810	Headache attributed to pituitary apoplexy	Headache, vomiting, and visual deficit

IHS, International Headache Society; MELAS, *mitochondrial myopathy, encephalopathy, lactic acidosis*, and strokelike episodes; WHO, World Health Organization.

responsible for the pain, which settles rapidly as the injury recovers. In the absence of neurologic signs, neuroimaging is probably not required, but the child should be observed carefully.

Chronic Posttraumatic Headache

IHS code and diagnosis: 5.2 Chronic posttraumatic headache
WHO code: G44.3

Children often suffer from chronic headache after head injury. The occurrence of chronic posttraumatic headaches appears unrelated to the age of the patient and apparent severity of the injury. Some studies have suggested that chronic headache may be more likely to follow mild rather than severe head injury (18). There is often no evidence of any intracranial injury or cerebral edema at the time of injury, and it is not known why symptoms may develop. Some cases of apparent chronic posttraumatic headache may represent analgesic-overuse headache where excessive amounts of analgesics have been used for pain associated with the acute trauma.

POSTCOITAL AND POSTMASTURBATORY HEADACHE

IHS code and diagnosis: 4.4 Primary headache associated with sexual activity
WHO code: G44.805

Many adolescents are sexually active, and headache associated with sexual activity may cause considerably anxiety. In others the headache may be associated with masturbation. Most of these headaches are benign but intracranial hemorrhage during sexual activity has been reported. Treatment is usually by explanation and reassurance that there is no serious underlying abnormality. Drug therapy has been used but there is no evidence of its efficacy.

METABOLIC DISORDERS

IHS code and diagnosis: 10.7 Headache attributed to other disorder of homeostasis
WHO code: G44.882

Headache is a feature of many metabolic disorders during episodes of metabolic decompensation. It is seen in inborn errors of metabolism and in secondary metabolic disorders such as hepatic and renal failure. Headache is only one of many clinical features, and other features normally predominate. These conditions are rarely confused with any primary headache syndrome.

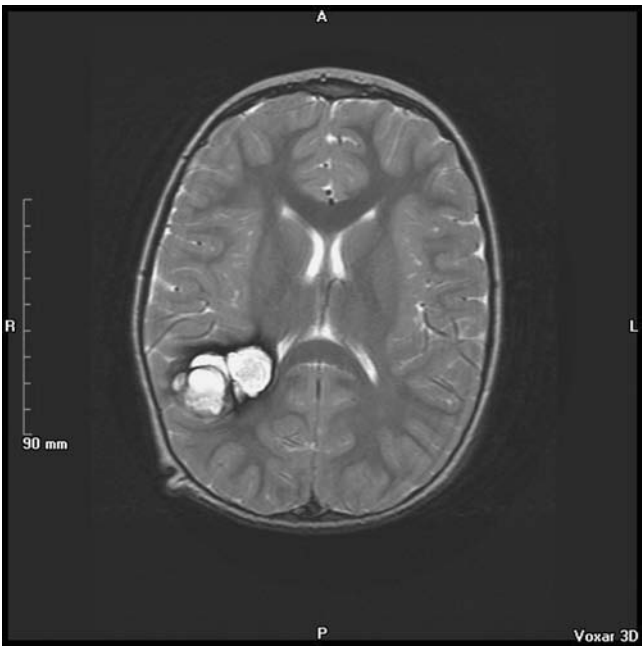


FIGURE 132-1. Magnetic resonance imaging scan showing a cavernoma that presented with headache. T2 image. (Courtesy of Dr. M. Trewhella.)

VASCULAR DISORDERS (Table 132-1)
(See also Fig. 132-1)

Vascular disorders are rare causes of headache in children and adolescents. Usually other symptoms and physical signs are more prominent than headache.

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