

Headache in Pediatrics

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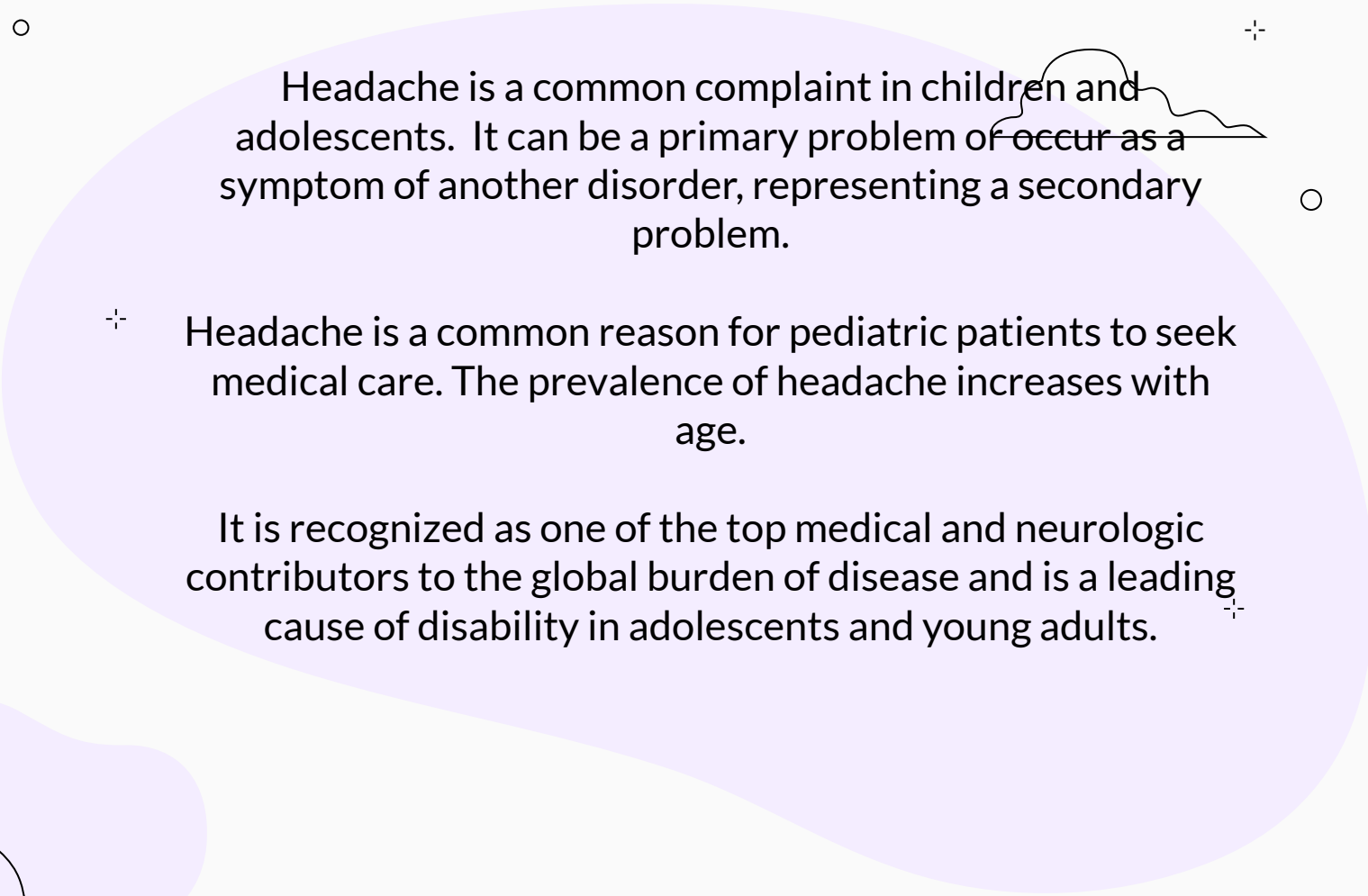
Approach





01.

DEFINITION



Headache is a common complaint in children and adolescents. It can be a primary problem or occur as a symptom of another disorder, representing a secondary problem.

Headache is a common reason for pediatric patients to seek medical care. The prevalence of headache increases with age.

It is recognized as one of the top medical and neurologic contributors to the global burden of disease and is a leading cause of disability in adolescents and young adults.



02.

EPIDEMIOLOGY

EPIDEMIOLOGY



60%

Of children reported having had headache over periods of time ranging from 1m over lifetime



90%

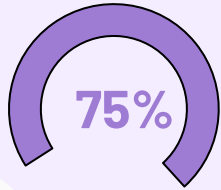
By the age of 18yrs more than 90% of adolescents reported having had headache

EPIDEMIOLOGY

nearly 60 percent of children reported having had headaches over periods of time (ranging from one month to "lifetime"). By age 18 years, more than 90 percent of adolescents report having had a headache .

Before 12 years of age, the prevalence of headaches is similar among males and females (approximately 10 percent) . After age 12 years, the prevalence is higher in females (approximately 28 to 36 percent versus 20 percent). Headaches occur more often in children who have a family history of headaches in first- or second-degree relatives.

EPIDEMIOLOGY OF PRIMARY HEADACHE



15 yr of age

Up to 75% of children report having a significant headache by the time they are 15 yr of age.



Migraine between the ages of 5 and 15 yr

Migraine has been reported to occur in up to 10.6% of children between the ages of 5 and 15 yr and up to 28% of older adolescents.



Chronic migraine

Chronic migraine occurs in up to 1% of children and adolescents

EPIDEMIOLOGY OF PRIMARY HEADACHE

Up to 75% of children report having a significant headache by the time they are 15 yr of age. Recurrent headaches are less common, but remain highly frequent. Migraine has been reported to occur in up to 10.6% of children between the ages of 5 and 15 yr and up to 28% of older adolescents. When headaches are occurring more than 15 days a month they are termed chronic migraine and may occur in up to 1% of children and adolescents.

The risk of conversion to a daily headache becomes more likely as the frequency increases or ineffective acute treatments are utilized. This explains the necessity to treat the headaches aggressively or prevent the headaches altogether, trying to block transformation to chronic migraine.

EPIDEMIOLOGY OF SECONDARY HEADACHE



86%

of high school and college athletes who experienced head trauma may develop headache



56%

of patients with headaches at 3 mo following injury had a family history of migraine



90%

of adults diagnosed as having a sinus headache either by themselves or their physician appear to have migraine.

EPIDEMIOLOGY OF SECONDARY HEADACHE

Headache is a common occurrence following concussion or mild traumatic brain injury (mTBI), reported in as many as 86% of high school and college athletes who have suffered from head trauma. Although there are no strict criteria for determining who will develop persistent headache following concussion, it is important to gather information to rule out other secondary headaches and significant primary headache disorders and to identify those who may be at risk for persistent headache following concussion.

Chronic or persistent headaches are headaches that last for more than 3 mo following head trauma. This definition is consistent with the classification of persistent posttraumatic headaches in the ICHD-3b.

Although concussion and posttraumatic headache are rapidly evolving areas of study, there is an unfortunate lack of definitive scientific evidence at this time on these topics in pediatrics.

Sinus headache is the most overdiagnosed form of recurrent headache.

Although no studies have evaluated the frequency of misdiagnosis of an underlying migraine as a sinus headache in children, in adults, it has been found that up to 90% of adults diagnosed as having a sinus headache either by themselves or their physician appear to have migraine.

Some studies have shown that about half of children with posttraumatic headache 3 mo after concussion had a history of preexisting headaches, and 31% had a history of migraine or probable migraine before the injury. Furthermore, 56% of patients with headaches at 3 mo following injury had a family history of migraine

03. TYPES

International Classification of Headache Disorders (ICHD)



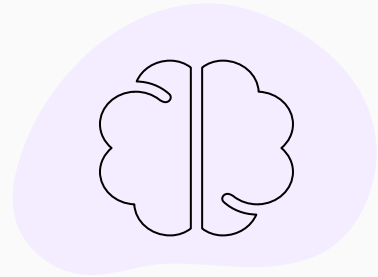
Primary
headache disorder



Secondary
headache disorder

TYPES OF HEADACHE

Headache is a common complaint in children and adolescents. Headaches can be a primary problem or occur as a symptom of another disorder (a secondary headache). Recognizing this difference is essential for choosing the appropriate evaluation and treatment to ensure successful management of the headache. Primary headaches are most often recurrent, episodic headaches and for most children are sporadic in their presentation





+ ICHD : International Classification of Headache Disorders (ICHD) (3rd Edition)

It is an algorithmic system to define and classify all known headache disorders. It is divided into primary headache disorders such as migraine and symptomatic headaches which are a symptom of a different disorder.



International Classification of Headache Disorders (ICHD)



PRIMARY

- Migraine
- Tension-type headache
- Trigeminal autonomic cephalalgias
- Other primary headache disorders

Primary Headaches



Cluster
headache

Tension
headache

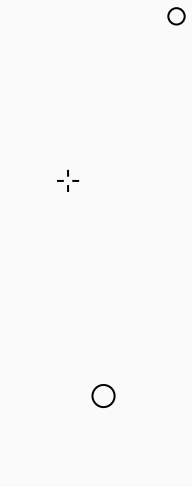
Migraine



PRAIMARY

The most common forms of primary headache in childhood are migraine and tension-type headaches.

Primary headache can progress to very frequent or even daily headaches with chronic migraine and chronic tension-type headaches being increasingly recognized as a problem for children and adolescents. hese more frequent headaches can have an enormous impact on the life of the child and adolescent, as reflected in school absences and decreased school performance, social withdrawal, and changes in family interactions. To reduce this impact, a treatment strategy that incorporates acute treatments, preventive treatments, and biobehavioral therapies must be implemented.



International Classification of Headache Disorders (ICHD)



SECONDARY

- Headache attributed to trauma or injury to the head and/or neck
- Headache attributed to cranial and/or cervical vascular disorder
- Headache attributed to non-vascular intracranial disorder
- Headache attributed to a substance or its withdrawal
- . Headache attributed to infection
- Headache attributed to disorder of homoeostasis
- Headache or facial pain attributed to disorder of the cranium, neck, eyes, ears, nose, sinuses, teeth, mouth or other facial or cranial structure
- Headache attributed to psychiatric disorder

SECONDARY

Secondary headache is a headache that is a symptom of an underlying illness. The underlying illness should be clearly present as a direct cause of the headaches with close association of timing and symptomatology. This occurs when two or more common conditions occur in close temporal association. This frequently leads to the misdiagnosis of a primary headache as a secondary headache. In general, the key components of a secondary headache are the likely direct cause-and-effect relationship between the headache and the precipitating condition. In this regard, when the presumed cause of the secondary headache has been treated (antibiotics) or given adequate time to recover (posttraumatic headache), the headache symptoms should have resolved. If this does not occur, either the diagnosis must be reevaluated or the effectiveness of the treatment reassessed.

POSTTRAUMATIC HEADACHE (ICHD-3b classification)



CHRONIC

Persistent/Chronic

Lasts for more than 3 months
following head trauma

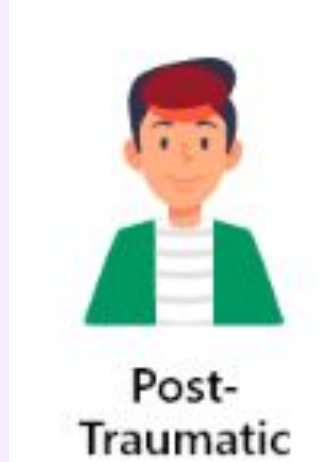


ACUTE

acute

Lasts for less than 3 months
following head trauma

When do posttraumatic headaches typically begin
according to the ICHD-3 criteria?

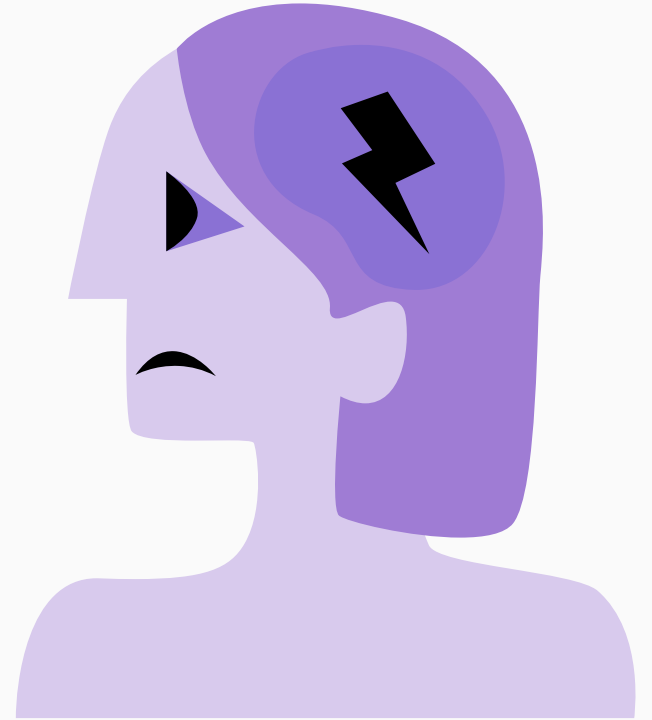


When do posttraumatic headaches typically begin according to the ICHD-3 criteria?

Although the ICHD-3 criteria state that posttraumatic headaches begin within 7 days after injury to the head or after regaining consciousness, the authors comment that this 7-day cutoff is arbitrary, and some experts believe that headaches may develop after a longer interval.

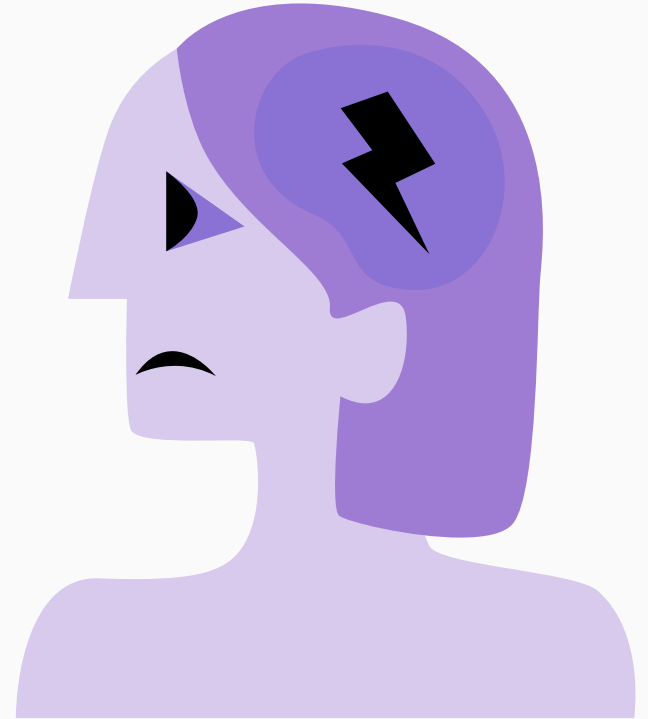
01.

Primary Headaches



Definition

Primary headaches are a common and often debilitating concern among pediatric populations. These headaches are characterized by **recurrent episodes of head pain that arise independently, without being attributed to an underlying medical condition.** They are distinct from secondary headaches, which are caused by an underlying medical problem, such as infection or injury. In pediatrics, primary headaches can significantly impact a child's quality of life, including their ability to engage in daily activities, concentrate at school, and participate in social interactions.





Types of primary headaches:

1. Migraine
 2. Tension headache
 3. Cluster headache
- 

Case 1

Sara, a 14-year-old female, presents with recurrent severe headaches since age 10. Headaches occur **twice a month**, lasting **6-8** hours, characterized by **throbbing** pain on the right side, accompanied by **nausea, vomiting, photophobia, and phonophobia**. She misses school due to the debilitating nature of headaches. No family history of migraines; mother experiences tension-type headaches occasionally. Sara is active academically and in extracurriculars but **struggles with missed school days**. **Neurological and physical examinations show no abnormalities**



Migraine

The most common type of headache in the pediatric population with female predominance.

Definition: A recurrent headache with symptom-free intervals and can be associated with the following:


- Abdominal pain.
- Nausea and/or vomiting.
- Throbbing headache.
- Often bilateral (versus unilateral in adults).
- Associated aura, it may be typical (visual, sensory, or dysphasic) or atypical (i.e., hemiplegic, “Alice in Wonderland” syndrome)
- Relieved by sleep.
- Family history of migraines.

Clinical manifestation may vary according to age



Pathophysiology

Migraines involve a combination of genetic predisposition, neurochemical imbalances (including serotonin), **cortical spreading depression**, abnormal blood vessel dilation, sensory sensitivity, and triggers like stress and hormonal changes, leading to intense throbbing pain, often preceded by an aura, and other neurological symptoms.



Epidemiology

Previous studies in Jordan and Austria reported high prevalence of primary headache among school students (67.2% and 75.7% respectively) [[14](#),[15](#)]. **The current study showed most children suffered from migraine headache (44.8%) followed by tension type headaches (8.7%).**


[https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8121873/#:~:text=Previous%20Ostudies%20in%20Jordan%20and,tension%20type%20headaches%20\(8.7%25\).](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8121873/#:~:text=Previous%20Ostudies%20in%20Jordan%20and,tension%20type%20headaches%20(8.7%25).)



Migraine Classifications:

- Migraine Without Aura
- Migraine With Aura
- Chronic Migraine

The aura associated with migraine is a neurologic warning that a migraine is going to occur.



Migraine Without Aura

A. At least 5 attacks fulfilling criteria B to D

B. Headache attacks lasting 4-72 hr (untreated or unsuccessfully treated)

C. Headache has at least 2 of the following 4 characteristics:

1. Unilateral location
2. Pulsating quality
3. Moderate or severe pain intensity
4. Aggravation by or causing avoidance of routine physical activity (e.g., walking or climbing stairs)

D. During headache at least 1 of the following:

1. Nausea and/or vomiting
2. Photophobia and phonophobia

E. Not better accounted for by another ICHD-3 diagnosis

Migraine With Typical Aura

A. At least 2 attacks fulfilling criteria B and C

B. Aura consisting of visual, sensory, and/or speech/language symptoms, each fully reversible, but no motor, brainstem, or retinal symptoms

C. At least 2 of the following 4 characteristics:

1. At least 1 aura symptom spreads gradually over 5 or more minutes, and/or 2 or more symptoms occur in succession
2. Each individual aura symptom lasts **5-60 min**
3. At least 1 aura symptom is **unilateral**
4. The aura is accompanied, or followed within 60 minutes, by headache

D. Not better accounted for by another ICHD-3 diagnosis, and transient ischemic attack has been excluded

Migraine With Brainstem Aura

A. At least 2 attacks fulfilling criteria B to D

B. Aura consisting of visual, sensory, and/or speech/language symptoms, each fully reversible, but no motor or retinal symptoms

C. At least 2 of the following brainstem symptoms:

1. Dysarthria 2. Vertigo 3. Tinnitus 4. Hypoacusis 5. Diplopia 6. Ataxia 7. Decreased level of consciousness

D. At least 2 of the following 4 characteristics:

1. At least 1 aura symptom spreads gradually over 5 or more minutes, and/or 2 or more symptoms occur in succession
2. Each individual aura symptom lasts 5-60 min
3. At least 1 aura symptom is unilateral
4. The aura is accompanied, or followed within 60 min, by headache

E. Not better accounted for by another ICHD-3 diagnosis, and transient ischemic attack has been excluded.

Examples of Atypical Auras

- **Hemiplegia** (true weakness, not numbness, and may be familial)
- **Vertigo or lower cranial nerve symptoms** (formerly called basilar-type, formerly thought to be caused by basilar artery dysfunction, now thought to be a more brainstem-based migraine with brainstem aura)
- **Distortion** (Alice in Wonderland syndrome).
- Whenever these rarer forms of aura are present, further investigation is warranted.

Chronic migraine

- A. Headache (tension-type-like and/or migraine-like) on 15 or more days/mo for more than 3 mo and fulfilling criteria B and C**
- B. Occurring in a patient who has had at least 5 attacks fulfilling criteria B to D for 1.1 migraine without aura and/or criteria B and C for 1.2 migraine with aura**
- C. On 8 or more days/mo for more than 3 mo, fulfilling any of the following:**
 - 1. Criteria C and D for 1.1 migraine without aura**
 - 2. Criteria B and C for 1.2 migraine with aura**
 - 3. Believed by the patient to be migraine at onset and relieved by a triptan or ergot derivative**
- D. Not better accounted for by another ICHD-3 diagnosis**

Treatment

- **Avoid the possible triggers:** Often, migraines occur in response to specific triggers, such as psychological stress, strenuous exercise, sleep deprivation, cheese, chocolate, processed meat, or moving vehicles, and minimizing these factors may have great therapeutic effect.
- Consider **nonpharmacologic treatment** with biofeedback techniques in chronic stress headache.

For acute attacks:

- Dark, quiet environment and sleep.
- Adequate fluid intake.
- Pharmacologic therapy: Acetaminophen and nonsteroidal antiinflammatory drugs (NSAIDs) are **first line**.
- Second-line drugs include triptans, caffeine, and ergot alkaloids (status migrinosus).
- Antiemetics are helpful at the start of headache.
- Treatment should be instituted as early as possible in an attack.

Prophylaxis

- Antiepileptic drugs, such as topiramate, valproate, levetiracetam.
- Tricyclic antidepressants such as amitriptyline.
- β -blockers such as propranolol.

When the headaches are **frequent** (more than one headache per week) or **disabling** (causing the patient to miss school, home, or social activities, or having a PedMIDAS score > 20)

Migraine

Epidemiology

♀ > ♂ (3:1)

Duration

4–72 hours

Frequency

Up to several times per month

Age of onset

Typically during adolescence and early adulthood (15–25 years of age)

Therapy

NSAIDs or triptans;
antiemetics for nausea

Remember

Overuse of triptans can cause medication-overuse headaches



Triggers

E.g., weather changes, alcohol, stress, physical activity
♀: menstruation, oral contraceptive pills






Character of pain

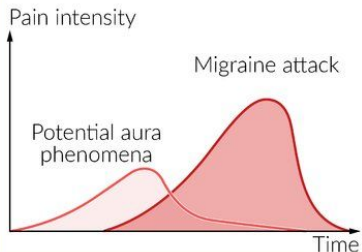
Pounding, throbbing



Additional symptoms

-  Nausea, vomiting, anorexia or excessive hunger
-  Phonophobia/photophobia
-  25% with aura phenomena

Course of an attack



Prophylaxis



Lifestyle changes

E.g., endurance sports and stress reduction

Case 2

Ahmad, a 12-year-old boy, presents with **severe, piercing headaches** localized around **his left eye**, occurring **daily for a week**, lasting **20-30** minutes. During episodes, he becomes restless and agitated, **holding his left eye**. No previous history of similar headaches. Physical exam reveals no neurological deficits.



Cluster Headache

Brief, severe, unilateral stabbing headaches that occur multiple times daily over a period of several weeks and tend to be seasonal.

- Onset after 10 years of age.
- Male predominance.
- Conjunctival injection, tearing, rhinorrhea.
- **Prophylaxis** with lithium or calcium channel blocker.
- **Acute treatment** with 100% oxygen or sumatriptan and dihydroergotamine (DHE).

Pathophysiology

Cluster headaches involve the hypothalamus, circadian rhythm disruption, vascular changes, trigeminal nerve activation, and likely genetic factors. Intense pain focused around one eye occurs in cycles, often linked to specific times of day or night, and is accompanied by autonomic symptoms.

TABLE 28.15 Cluster Headache

- A. At least 5 attacks fulfilling criteria B-D
- B. Severe or very severe unilateral orbital, supraorbital, and/or temporal pain lasting 15-180 min (when untreated)*
- C. Either or both of the following:
 - 1. At least 1 of the following symptoms or signs, ipsilateral to the headache:
 - a) Conjunctival injection and/or lacrimation
 - b) Nasal congestion and/or rhinorrhea
 - c) Eyelid edema
 - d) Forehead and facial sweating
 - e) Forehead and facial flushing
 - f) Sensation of fullness in the ear
 - g) Miosis and/or ptosis
 - 2. A sense of restlessness or agitation
- D. Attacks have a frequency between 1 every other day and 8 per day for more than half of the time when the disorder is active
- E. Not better accounted for by another ICHD-3 diagnosis

Cluster headache

Epidemiology

♂ > ♀ (3:1);
typically 20–40 years of age

Duration

~30–40 min/attack

Frequency

Typically ~1–3 attacks/24 h

Note

Attacks often occur at night;
patient is restless and paces around
during an attack

Therapy

Acute: triptans, 100% O₂
Chronic: verapamil (prophylactic)

Triggers

Alcohol,
insomnia,
nitrates,
bright lights





Character of pain

Stabbing,
burning



Additional symptoms

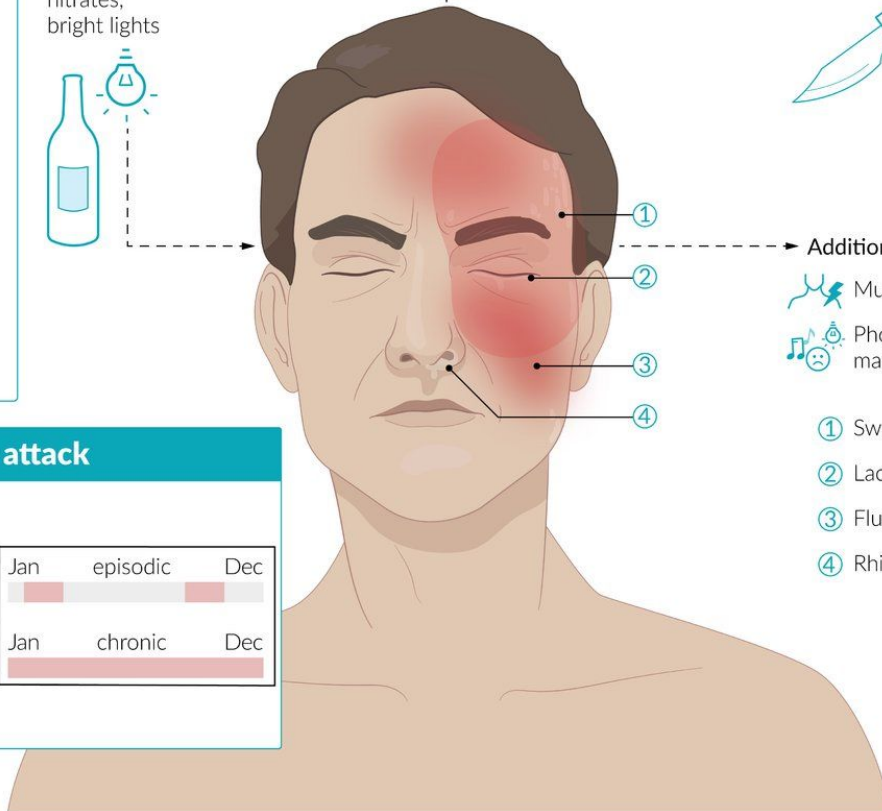
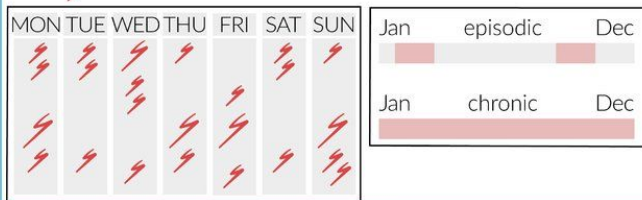
 Muscle tension
 Phono-/Photophobia
may occur

- ① Sweating
- ② Lacrimation, conjunctival injection
- ③ Flushing
- ④ Rhinorrhea, nasal congestion

Course of an attack

Periods of cluster headache

⚡ = Acute attack



Case 3

Khaled, a 15-year-old boy, experiences frequent **dull headaches resembling a tight band around his head**, occurring **twice a week** for **several hours**. Stressful situations, particularly related to school exams, trigger these headaches. Physical exam is unremarkable.



Tension Headache

Tension or stress headaches are rare in children prior to puberty and are often difficult to differentiate from migraines.

Presentation

- Most often occur with a stressful situation, such as an exam.
- Described as “hurting” but not “throbbing.”
- It presents like a band around the head. It is present most of the times of the day.
- Unlike migraines and \uparrow intracranial pressure, tension headaches are not associated with nausea and vomiting.
- However, it is sometimes difficult to differentiate them from migraine.

Pathophysiology

Tension headaches stem from **muscle tension**, central sensitization, stress-related factors, and potential serotonin imbalances. These contribute to a dull, band-like pain around the head, with psychological stress and muscle tightness as key triggers.

Tension Headache

Diagnosis

- Diagnosis of exclusion.
- EEG or CT is not necessary.

Treatment

Steps should be taken to minimize anxiety and stress:

- Mild analgesics often are ample.
- Other options include counseling and biofeedback.
- Sedatives or antidepressants are rarely necessary

Tension headache

Epidemiology

Most common type of headache,
♀ > ♂, 30–40 years of age

Duration

30 min.–7 days (persistent)

Frequency

Rarely to daily

Note

Exertion does not exacerbate
the pain! No nausea or vomiting!

Therapy

Acute: NSAIDs

Chronic: amitriptyline (prophylactic)

Remember

Risk of medication-overuse headache

Triggers

Variable, incl.
depression,
anxiety disorders,
stress



Character of pain

Bilateral, dull, nonpulsatile,
compressing band-like or
vice-like quality



Additional symptoms



Tightness of nuchal muscles



Phonophobia/photophobia
uncommonly present

Prophylaxis



Variable, incl.

massage, behavioral
therapy; in chronic head-
aches, consider treatment
in a specialized clinic

Course of an attack

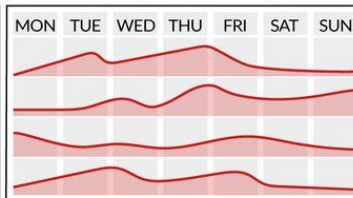
Episodic

Headache on < 15 days/month

MON	TUE	WED	THU	FRI	SAT	SUN
X		X	X			
	X			X	X	
		X		X		
			X		X	

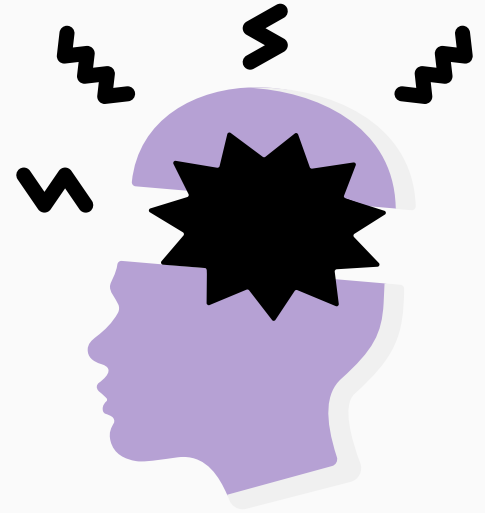
Chronic

Headache daily or on ≥ 15 days/month



02.

Secondary Headache



Secondary Headache

Secondary headaches are caused by an underlying condition, but it also include exacerbation of primary headaches by an underlying condition.

They usually have a specific cause that must be identified, and treatment of this cause should resolve the headache.

Note: Do not think of secondary headache right away in pediatrics, Common is Common:

- 1) Infection is the most typical cause of headache seen in the emergency department (due to meningitis, pharyngitis , otitis media , sinusitis)
- 2) Rule out trauma as a cause of headache.
- 3) Exclude any primary cause of headaches
- 4) Now look at secondary causes.

Secondary Headache in pediatrics

Table 613.1 Classification of Headaches (ICHD-3 Beta Code Diagnosis)

HEADACHE ATTRIBUTED TO TRAUMA OR INJURY TO THE HEAD AND/OR NECK

Acute headache attributed to traumatic (mild, moderate, or severe) injury to the head
 Persistent headache attributed to traumatic (mild, moderate, or severe) injury to the head
 Acute or persistent headache attributed to whiplash
 Acute or persistent headache attributed to craniotomy

HEADACHE OR FACIAL PAIN ATTRIBUTED TO DISORDER OF THE CRANIUM, NECK, EYES, EARS, NOSE, SINUSES, TEETH, MOUTH, OR OTHER FACIAL OR CERVICAL STRUCTURE

Headache attributed to disorder of cranial bone
 Headache attributed to retropharyngeal tendonitis
 Headache attributed to craniocervical dystonia
 Headache attributed to acute glaucoma
 Headache attributed to refractive error
 Headache attributed to heterophoria or heterotropia (latent or persistent squint)
 Headache attributed to ocular inflammatory disorder
 Headache attributed to tracheitis
 Headache attributed to disorder of the ears
 Headache attributed to acute or chronic or recurring rhinosinusitis
 Headache attributed to temporomandibular disorder
 Head or facial pain attributed to inflammation of the stylohyoid ligament
 Headache or facial pain attributed to other disorder of the cranium, neck, eyes, ears, nose, sinuses, teeth, mouth, or other facial or cervical structure

HEADACHE ATTRIBUTED TO PSYCHIATRIC DISORDER

Headache attributed to somatization disorder
 Headache attributed to psychotic disorder

HEADACHE ATTRIBUTED TO CRANIAL OR CERVICAL VASCULAR DISORDER

Headache attributed to ischemic stroke or transient ischemic attack
 Headache attributed to nontraumatic intracerebral hemorrhage
 Headache attributed to nontraumatic subarachnoid hemorrhage
 Headache attributed to nontraumatic acute subdural hemorrhage
 Headache attributed to unruptured vascular malformation
 Headache attributed to unruptured saccular aneurysm
 Headache attributed to arteriovenous malformation
 Headache attributed to dural arteriovenous fistula
 Headache attributed to cavernous angioma
 Headache attributed to encephalotrigeminal or leptomeningeal angiomatosis (Sturge-Weber syndrome)
 Headache attributed to arteritis
 Headache attributed to giant cell arteritis
 Headache attributed to primary angiitis of the central nervous system
 Headache attributed to secondary angiitis of the central nervous system
 Headache attributed to cervical carotid or vertebral artery disorder
 Headache or facial or neck pain attributed to cervical carotid or vertebral artery dissection
 Postendarterectomy headache
 Headache attributed to carotid or vertebral angioplasty
 Headache attributed to cerebral venous thrombosis
 Headache attributed to other acute intracranial arterial disorder
 Headache attributed to an intracranial endovascular procedure
 Angiography headache
 Headache attributed to reversible cerebral vasoconstriction syndrome
 Headache attributed to intracranial arterial dissection
 Headache attributed to genetic vasculopathy
 Cerebral autosomal dominant arteriopathy with subcortical infarcts and leukoencephalopathy (CADASIL)
 Mitochondrial encephalopathy, lactic acidosis, and stroke-like episodes (MELAS)
 Headache attributed to another genetic vasculopathy
 Headache attributed to pituitary apoplexy

HEADACHE ATTRIBUTED TO NONVASCULAR INTRACRANIAL DISORDER

Headache attributed to increased cerebrospinal fluid pressure
 Headache attributed to idiopathic intracranial hypertension
 Headache attributed to intracranial hypertension secondary to metabolic, toxic, or hormonal causes
 Headache attributed to intracranial hypertension secondary to hydrocephalus
 Headache attributed to low cerebrospinal fluid pressure
 Post-dural puncture headache
 Cerebrospinal fluid fistula headache
 Headache attributed to spontaneous intracranial hypotension
 Headache attributed to noninfectious inflammatory disease
 Headache attributed to neurosarcoidosis
 Headache attributed to aseptic (noninfectious) meningitis
 Headache attributed to other noninfectious inflammatory disease
 Headache attributed to lymphocytic hypophysitis
 Syndrome of transient headache and neurologic deficits with cerebrospinal fluid lymphocytosis (HaNDL)
 Headache attributed to intracranial neoplasm
 Headache attributed to colloid cyst of the third ventricle
 Headache attributed to carcinomatous meningitis
 Headache attributed to hypothalamic or pituitary hypersecretion or hyposecretion
 Headache attributed to intrathecal injection
 Headache attributed to epileptic seizure
 Hemicrania epileptica
 Postictal headache
 Headache attributed to Chiari malformation type I
 Headache attributed to other nonvascular intracranial disorder

Secondary Headache in pediatrics

Table 613.1 Classification of Headaches (ICHD-3 Beta Code Diagnosis)

HEADACHE ATTRIBUTED TO A SUBSTANCE OR ITS WITHDRAWAL

Headache attributed to use of or exposure to a substance
 Nitric oxide donor-induced headache
 Phosphodiesterase inhibitor-induced headache
 Carbon monoxide-induced headache
 Alcohol-induced headache
 Monosodium glutamate-induced headache
 Cocaine-induced headache
 Histamine-induced headache
 Calcitonin gene-related peptide-induced headache
 Headache attributed to exogenous acute pressor agent
 Headache attributed to occasional or long-term use of non-headache medication
 Headache attributed to exogenous hormone
Medication-Overuse Headache (MOH)
 Ergotamine-overuse headache
 Triptan-overuse headache
 Simple analgesic-overuse headache
 Paracetamol (acetaminophen)-overuse headache
 Acetylsalicylic acid-overuse headache
 Other nonsteroidal antiinflammatory drug-overuse headache
 Opioid-overuse headache
 Combination analgesic-overuse headache
Headache Attributed to Substance Withdrawal
 Caffeine-withdrawal headache
 Opioid-withdrawal headache
 Estrogen-withdrawal headache

HEADACHE ATTRIBUTED TO INFECTION

Acute or chronic headache attributed to bacterial meningitis or meningoencephalitis
 Persistent headache attributed to past bacterial meningitis or meningoencephalitis
 Acute or chronic headache attributed to intracranial fungal or other parasitic infection
 Headache attributed to brain abscess
 Headache attributed to subdural empyema
 Headache attributed to systemic infection (acute or chronic)

HEADACHE ATTRIBUTED TO DISORDER OF HOMEOSTASIS

Headache attributed to hypoxia and/or hypercapnia
 High-altitude headache
 Headache attributed to airplane travel
 Diving headache
 Sleep apnea headache
 Dialysis headache
 Headache attributed to arterial hypertension
 Headache attributed to pheochromocytoma
 Headache attributed to hypertensive crisis with or without hypertensive encephalopathy
 Headache attributed to preeclampsia or eclampsia
 Headache attributed to autonomic dysreflexia
 Headache attributed to hypothyroidism
 Headache attributed to fasting
 Cardiac cephalalgia
 Headache attributed to other disorder of homeostasis

PAINFUL CRANIAL NEUROPATHIES AND OTHER FACIAL PAINS

Classical trigeminal neuralgia
 Classical trigeminal neuralgia, purely paroxysmal or with concomitant persistent facial pain
 Painful trigeminal neuropathy
 Painful trigeminal neuropathy attributed to acute herpes zoster
 Postherpetic trigeminal neuropathy
 Painful posttraumatic trigeminal neuropathy
 Painful trigeminal neuropathy attributed to multiple sclerosis (MS) plaque
 Painful trigeminal neuropathy attributed to space-occupying lesion
 Painful trigeminal neuropathy attributed to other disorder
 Glossopharyngeal neuralgia
 Classical nervus intermedius (facial nerve) neuralgia
 Nervus intermedius neuropathy attributed to herpes zoster
 Occipital neuralgia
 Optic neuritis
 Headache attributed to ischemic ocular motor nerve palsy
 Tolosa-Hunt syndrome
 Paratrigeminal oculosympathetic (Raeder) syndrome
 Recurrent painful ophthalmoplegic neuropathy
 Burning mouth syndrome (BMS)
 Persistent idiopathic facial pain (PIFP)
 Central neuropathic pain
 Central neuropathic pain attributed to multiple sclerosis
 Central post-stroke pain (CPSP)

Pathophysiology of Headaches

The brain tissues themselves are almost totally insensitive to pain

Conversely, tugging on the venous sinuses around the brain, damaging the tentorium, or stretching the dura at the base of the brain can cause intense pain that is recognized as headache.

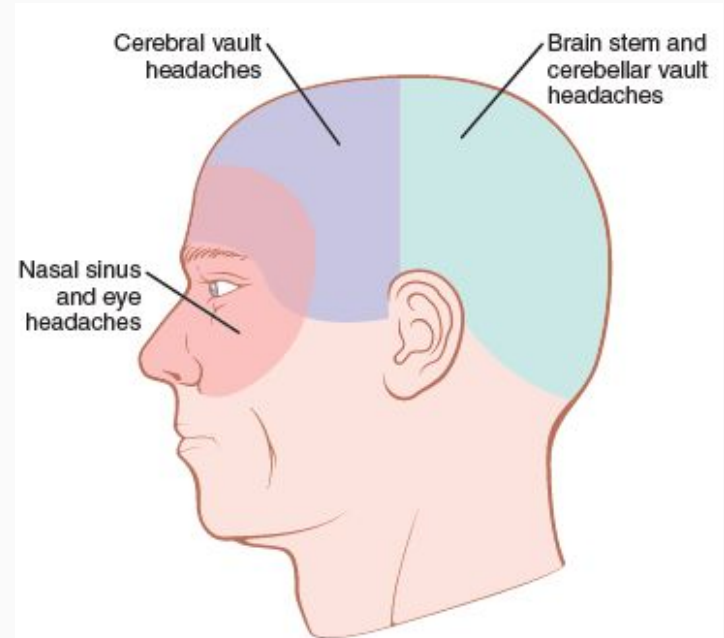


Figure 49-9. Areas of headache resulting from different causes.

1) Acute Febrile Illness

One of the most common causes of secondary headaches.

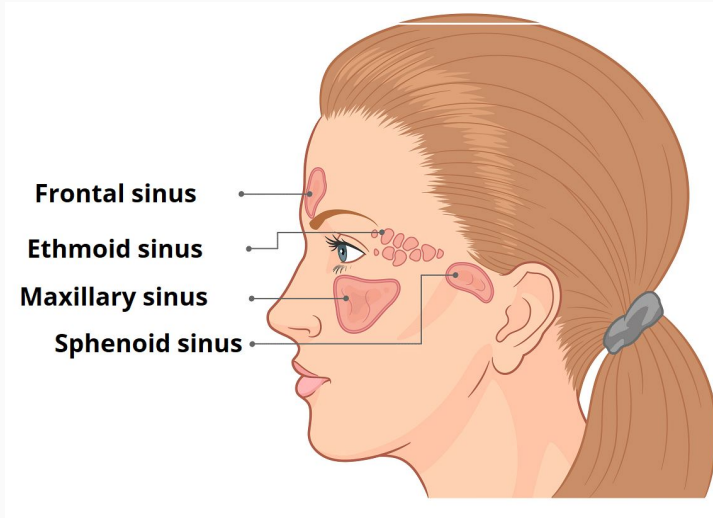
✦ Could be in the CNS (Meningitis, encephalitis) or outside the CNS (Sinusitis).

A) Sinusitis:

Inflammation of the nasal sinuses, usually caused by bacteria. Usually asymptomatic but infection or other irritative processes in widespread areas of the nasal structures often summate and cause headache that is referred behind the eyes or, in the case of frontal sinus infection, to the frontal surfaces of the forehead and scalp.

Causes: Usually viral or bacterial (Streptococcus pneumonia, Moraxella catarrhalis, Haemophilus influenza) or fungal (Aspergillus).

✦ **Treatment:** according to the cause (supportive or amoxiclav).



1) Acute Febrile Illness

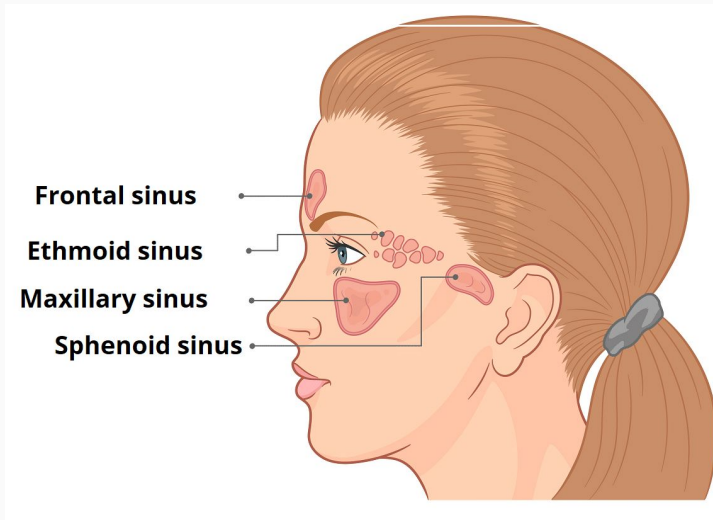
One of the most common causes of secondary headaches.

✦ Could be in the CNS (Meningitis, encephalitis) or outside the CNS (Sinusitis).

A) Sinusitis:

Sinus headache is the most overdiagnosed form of recurrent headache. 90% of adults diagnosed as having a sinus headache either by themselves or their physician appear to have migraine.

Note: When headaches are recurrent and respond within hours to analgesics, migraine should be considered first. In the absence of purulent nasal discharge, fever, or chronic cough, the diagnosis of sinus headache should not be made.



1) Acute Febrile Illness

✦ One of the most common causes of secondary headaches.

Could be in the CNS (Meningitis, encephalitis) or outside the CNS (Sinusitis).

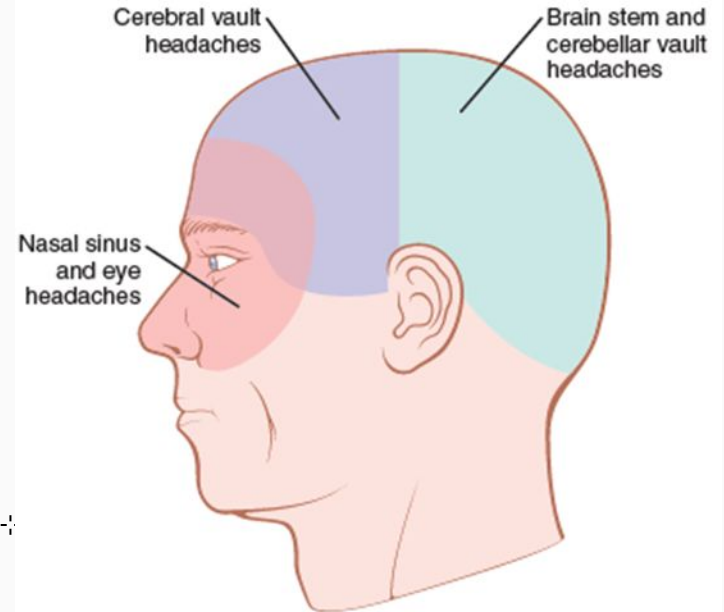
B) Meningitis:

Very severe headache, inflammation of all the meninges, including the sensitive areas of the dura and the sensitive areas around the venous sinuses.

Other Symptoms: fever; photophobia, projectile vomiting, loss of consciousness and lethargy, headache is usually global and not localized.

✦ **Causes:** Usually bacterial.

Treatment: According to the sensitivity.



✦ **Figure 49-9.** Areas of headache resulting from different causes.

1) Acute Febrile Illness

✦ One of the most common causes of secondary headaches.

Could be in the CNS (Meningitis, encephalitis) or outside the CNS (Sinusitis).

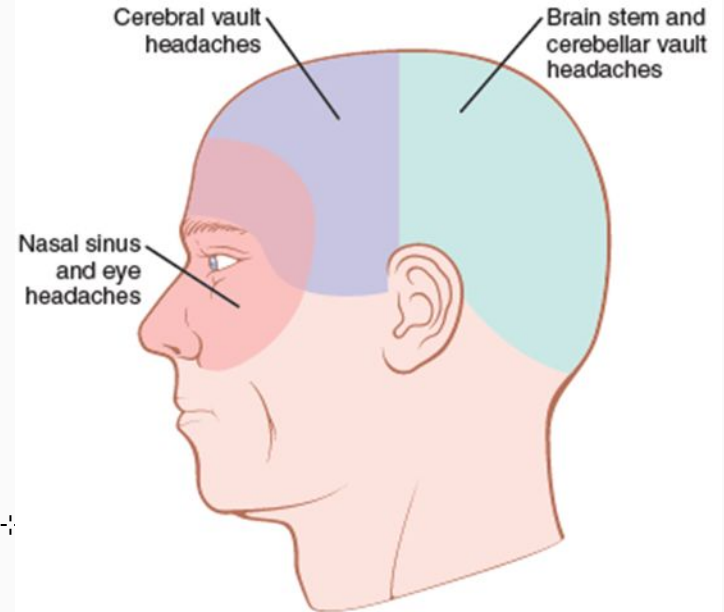
C) Encephalitis:

Very severe headache **with focal neurological deficit.**

Special Symptoms: fever, seizures, focal neurological deficit and the headache is might be localized to single area.

Causes: Usually bacterial.

Treatment: According to the sensitivity.



✦
○
○
Figure 49-9. Areas of headache resulting from different causes.

Post-Traumatic Headache



INTRACRANIAL HEMORRHAGE

Common causes or suspected causes of secondary headaches in children include the sequelae of head trauma (subdural OR epidural hemorrhage) Posttraumatic headaches sometimes occur in children who have not had a prior history of headaches and are temporally related to the initiating head injury.

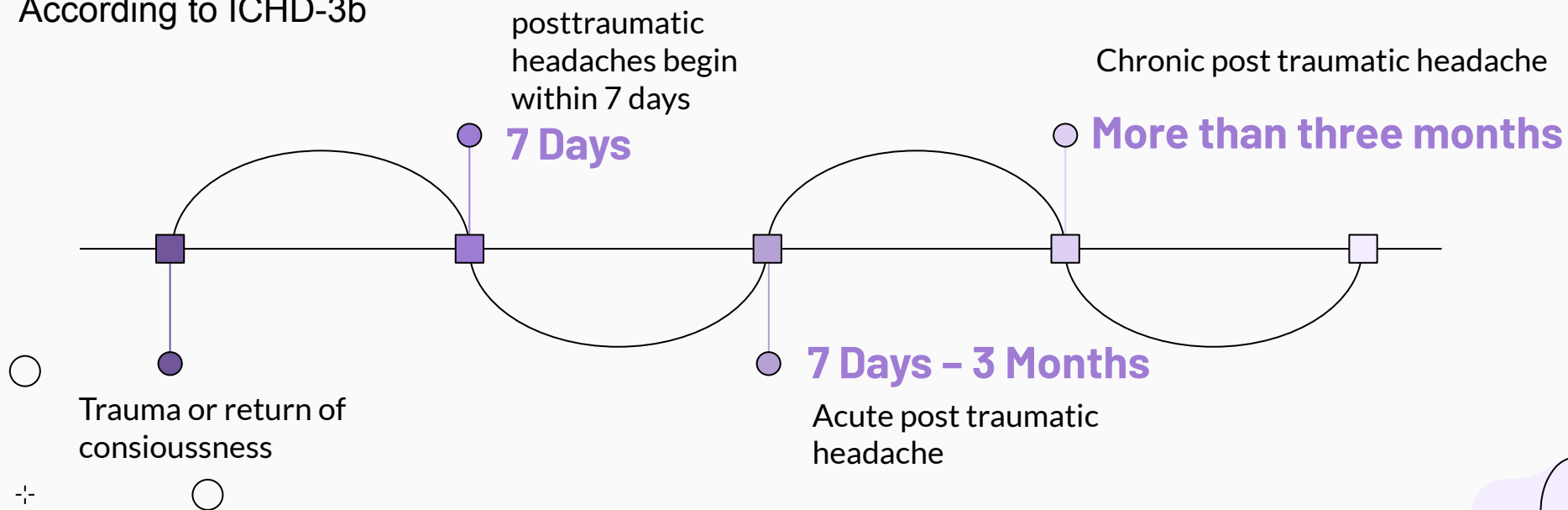
The head injury may be minor or major.

May be Spontaneous as in the acute subarachnoid hemorrhage which usually presents with a sudden severe headache (mainly arterial with high flow and rapid development).

Post-Traumatic Headache

Headache is a common occurrence following concussion or mild traumatic brain injury (mTBI), reported in as many as 86% of high school and college athletes who have suffered from head trauma.

According to ICHD-3b



Post-Traumatic Headache



Risk Factors for developing concussion and persistent posttraumatic headaches:

- 1) Having a personal or family history of migraine
- 2) Personal or family history of mood disorders
- 3) Prior concussion

Post-Traumatic Headache



Special features of the headache: no strong literature.

A posttraumatic headache generally presents with clinical features that are observed in primary headache disorders, including tension-type, migraine, and cervicogenic headaches.

Treatment: Little evidence.

Frequent analgesics → can cause medication-overuse headaches.



Medication-overuse headaches (MOHs)

Definition:

A headache present for more than 15 days/month for longer than 3 months and intake of a simple analgesic on more than 15 days/month and/or prescription medications, including triptans or combination medications, on more than 10 days/month.

It frequently complicates primary and secondary headaches.

Some of the signs that should raise suspicion of medication overuse are the increasing use of analgesics (nonprescription or prescription) with either decreased effectiveness or frequent wearing off (i.e., analgesic rebound).

Treatment: Stop analgesics.

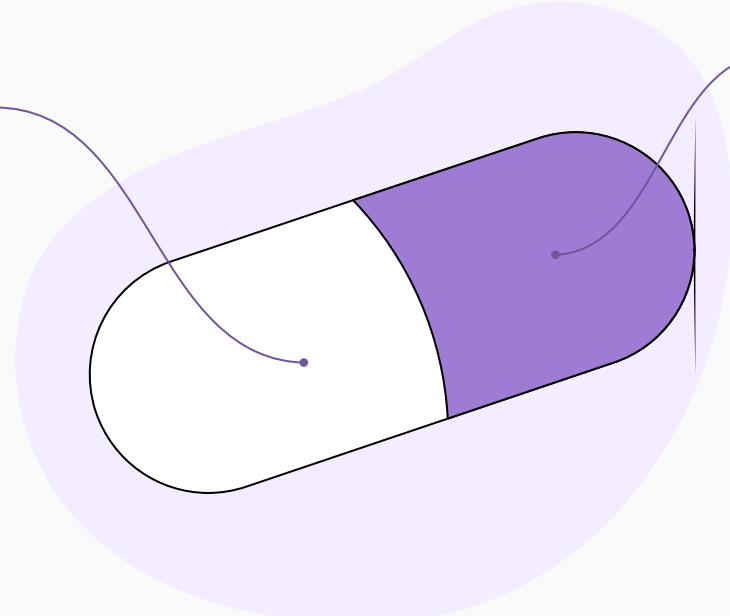


INCREASED INTRACRANIAL PRESSURE



Mass

Tumor
Vascular Malformation
Cystic Structure



Intrinsic Increase in Pressure

Idiopathic Intracranial Hypertension (Pseudotumor cerebri)

The headache is caused by the mass effect and local pressure on the dura.

The headache is caused by diffuse pressure on the dura.

Intrinsic Increase in Pressure

A condition in which there is an increased intracranial pressure with no apparent reason. normal CSF composition, and no other cause of intracranial hypertension evident on neuroimaging or other evaluations.

Etiology:

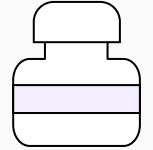
- the intake of excessive amounts of fat-soluble compounds (e.g., vitamin A, retinoic acid, and minocycline)
- Hormonal changes (increased incidence in females)
- Blockage of venous drainage (as with inflammation of the transverse venous sinus from mastoiditis).

Treatment:

- Open Tap Lumbar Puncture (therapeutic and diagnostic)
- Carbonic anhydrase inhibitors (acetazolamide)

If headache persists or there are visual field changes.

Approach to patient with Idiopathic Intracranial Hypertension



Clinical History Suggest IIH

- Severity and frequency increase over time
- Poor response to analgesics
- Awake the child from the sleep OR occur soon after awakening (worse at morning and improve as the day progress.)
- Associated with projectile vomiting which temporarily relive the pain
- Papilledema or focal neurological deficits

MRI,
MRA,
MRV

Mass or
Vascular
Malformation

No Mass or
Vascular
Malformation

Refer

LP

Spine tap

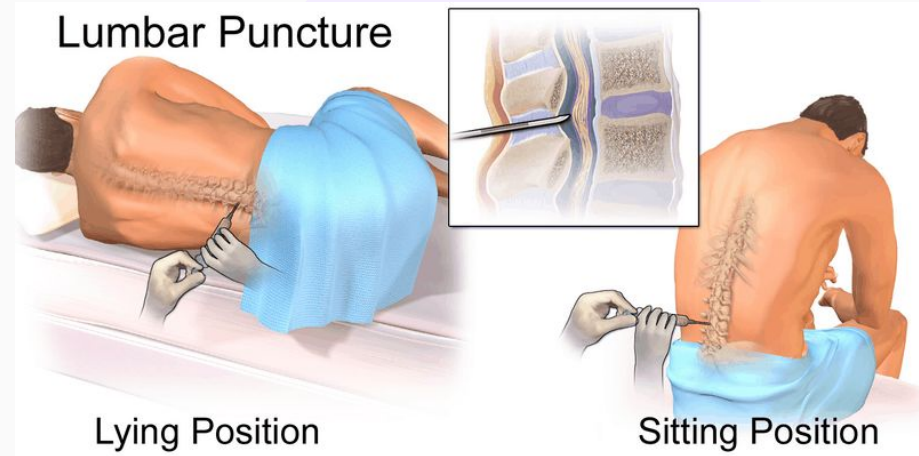
01.

Patient in patient in a relaxed recumbent position

02.

Legs extended

Because abdominal pressure can artificially raise intracranial pressure.



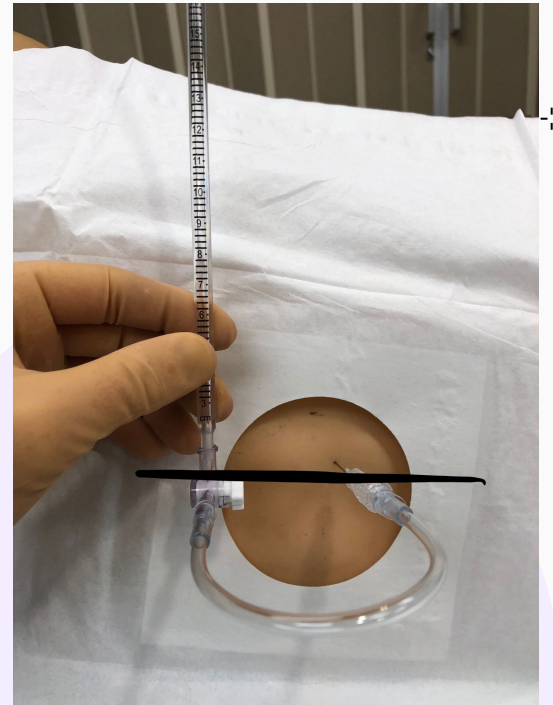
Open Pressure

01.

After the needle is inserted, the manometer is attached to the needle.

02.

The fluid will rise in the manometer and give the pressure in the cerebrospinal fluid (unit is cmH_2O)



COULD LEAD TO VISION LOSS

01.

1. Discontinuing the offending drugs (Vit. A) and treat the underlying systemic disease.

02.

Medication

- Carbonic anhydrase inhibitors
- Migraine medications??

03.

Still not relived >>> Surgery

- Optic nerve fenestration
- CSF shunting

Idiopathic Intracranial Hypertension

(formerly known as pseudotumor cerebri)



Papilledema



Young, obese females



Vitamin A toxicity and derivatives, oral contraceptives, steroids, tetracyclines

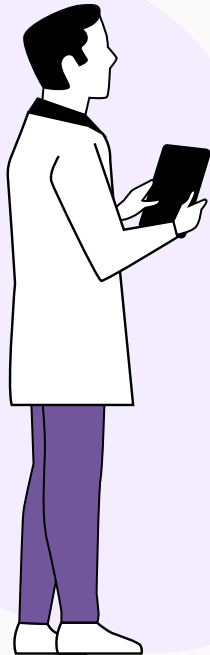


Diplopia with lateral gaze, CN VI palsy, loss of peripheral visual fields



Elevated opening pressure on lumbar puncture

The Approach to History Taking



- The headache history provides most of the necessary diagnostic information in the evaluation of childhood headaches . A thorough history helps to focus the physical examination and prevent unnecessary investigation and neuroimaging.
- The history should initially be obtained from the child and confirmed by the caregivers. In young children, caregiver observation of behavior can support the diagnostic criteria.
- A diary in which the quality, location, severity, timing, precipitating and palliating factors, and associated features of the headache are recorded prospectively may be a useful adjunct if the child is willing and able to complete on a daily basis.

Headache Pattern

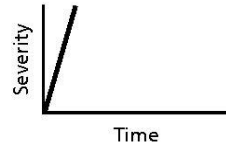
- ❖ Determining if a headache is new or represents a recurrent problem is useful in differentiating primary from secondary headaches. Most primary headaches are episodic headaches that may transform to more frequent headaches (chronification). An acute change in an underlying recurrent, episodic headache disorder is a potentially concerning pattern.
- ❖ Rothner classified pediatric headaches into five temporal patterns, each of these patterns provide its own set of differential diagnosis that can guide further diagnostic testing.

Table 1 Pediatric Headache Patterns and Potential Causes

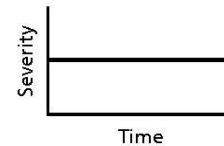
Headache Pattern	Potential Causes
Acute Headache	Infection (Paranasal infection, URI with fever, Sinusitis, Otitis media, Pharyngitis, Meningitis), Subarachnoid/Intracranial hemorrhage, Stroke, Hypertension, Metabolic causes (hypoglycemia, hypercapnia, hypoxia), Post-seizure, Substance abuse, Intoxication, Trauma
Acute Recurrent Headache	Migraine, Tension type headache, Cluster headache, Paroxysmal hemicrania, Exercise headache, Cranial neuralgias
Chronic Progressive Headache	CNS neoplasm, brain abscess, subdural hematoma, hydrocephalus, chronic meningitis, PIH
Chronic Non-Progressive Headache	Chronic migraine, Chronic tension type headache, Post-concussion, Medication over-use headache, depression
Mixed Headache	Primary headache disorder (eg chronic migraine, chronic tension type headache) with superimposed secondary cause

Acute headache

Single episode of head pain without history of previous events

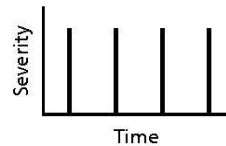


Chronic-nonprogressive (or chronic-daily) headache
Frequent or constant headache

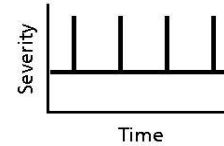


Acute-recurrent headache

Pattern of head pain separated by symptom-free intervals

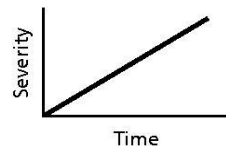


Mixed headache
Acute-recurrent headache (usually migraine) superimposed on a chronic-daily background pattern (represents a variant of chronic-daily headache)



Chronic-progressive headache*

Gradual increase in frequency and severity



Adapted from Rothner AD. The evaluation of headaches in children and adolescents. Semin Pediatr Neurol 1995;2:109-118.

The Approach to History Taking

- +
- ◆ **When did your headache start and how often does it occur ?**
- ◆ Identify the age of onset as it may differentiate between headache types.
- ◆ Some patients can easily identify the onset of their headache and factors that may have initiated it. This may be physical, as in the case of head trauma, or psychological, as in the case of parental separation, the death of a close relative or friend, or moving to another community.
- ◆ The frequency of the headache can be helpful in establishing the type of headache. For example, migraines most frequently occur 2-4 times per month. They almost never occur daily. Cluster headaches may occur episodically 2-3 times per day for several months then disappear for months to years. Chronic nonprogressive headaches may be daily or occur 5 to 7 days each week for months to years.

The Approach to History Taking

◆ Where is the location of your headache?

- ◆ Bandlike ? bifrontal or bitemporal pain ?
- ◆ Strictly Unilateral or Bilateral ? Ocular or retro-orbital ?
- ◆ Occipital headache, specifically when associated with abnormal neurologic examination, is an ominous sign for posterior fossa tumors or lesion in the craniocervical junction. However, a recurrent occipital headache in a child without atypical history and who has a normal neurologic examination is not more likely to be associated with intracranial pathology than headaches in other locations.

The Approach to History Taking

◆ Where is the location of your headache?

- ◆ Occipital localization can also occur with meningeal irritation from infection and with disorders of the joints, muscles, or ligaments of the upper cervical spine.
- ◆ Localized pain can be seen in otitis media, temporomandibular joint dysfunction.
- ◆ Paranasal pain localized to one or several sinuses, often associated with tenderness of the overlying periosteum and skin, occurs with acute sinus infection or outlet obstruction.
- ◆ A brief side-locked headache is characteristic for TACs. Due to its rarity in pediatric patients, pituitary lesions mimicking TAC must be excluded.

The Approach to History Taking

❖ What does your headache feel like?

- ❖ Migraine is typically described as throbbing or pounding; while pressure or dull are descriptors used for TTH.
- ❖ Sharp, stabbing, jabbing are words used to describe primary stabbing headaches or TACs. Shooting and/or shock-like pain is common in trigeminal neuralgia. For younger children, allowing them to draw their pain might provide valuable information.

❖ How long does your headache last?

- ❖ The duration of the headache also aids in making a specific diagnosis. Migraines in young children last 1 to 3 hours, rarely days. Migraine headaches in the adolescent may become longer and more severe. Chronic nonprogressive headaches may last all day.
- Cluster headaches usually last 30 to 60 minutes.

The Approach to **History Taking**

- ❖ **What triggers your headache, and what makes it better or worse?**
- ❖ specific circumstances that cause headaches ?
- ❖ headache provoked by straining, cough, exercise, Valsalva ?
- ❖ A small number of patients are able to identify specific foods that provoke migraines.
- ❖ stress, bright lights, noise, and strenuous activity usually make migraines worse

The Approach to History Taking

❖ Are there associated symptoms during the headache?

- ❖ This question focuses on searching for systemic and neurologic symptoms. Fever with behavioral changes can indicate infectious process.
- ❖ Early morning or nocturnal vomiting in a child with a headache that is progressively worsening may indicate intracranial mass.
- ❖ Pulsatile tinnitus in an obese child can be from PIH. Numbness and/or paresthesia, dysarthria, vertigo and motor weakness must be carefully dissected. While these are aura symptoms of migraine, vascular or demyelinating processes must be excluded.
- ❖ Autonomic symptoms such as lacrimation, facial flushing and/or sweating, nasal congestion and ptosis are associated symptoms of TACs.

The Approach to History Taking

- ❖ **Do you take headache medications or other medications for other medical conditions?**
- ❖ Reviewing the patient's medication list can provide clues to the diagnosis.
- ❖ stimulant drugs for ADHD, bronchodilators for asthma.
- ❖ A teenager with headache and seizure while on oral contraceptives can have cerebral venous sinus thrombosis (CVST).
- ❖ Frequent use of analgesics or triptans may lead to MOH.
- ❖ Adolescents should be screened for substance use such as THC that can cause reversible cerebral vasoconstriction syndrome.

The Approach to History Taking

- ❖ **Do you have other medical conditions?**
- ❖ Current or previous medical conditions can identify headache etiology.
- ❖ New onset headache in a patient with known malignancy might indicate metastatic disease.
- ❖ Opportunistic infection can occur in an immunocompromised patient presenting with headache and fever.
- ❖ Connective tissue disorders such as Ehlers-Danlos may have cervical arterial dissection presenting as thunderclap headache.
- +❖ Presence of anxiety or depression can contribute to perpetuation or worsening of headaches.



The Approach to **History Taking**

- ❖ **Is there a family history of headache or neurologic disorder?**
- ❖ Migraine is an inherited disorder, and absence of a family history of migraine has been regarded a predictor for space-occupying lesion and the need for neuroimaging.
- ❖ Consider that not all parents know their family history. Therefore, in the absence of a migraine family history in a child with headache consistent with migraine and normal neurologic examination, obtaining a brief parental headache history can disclose an undiagnosed migraine because a parent may not be aware that their mother or father had headaches when younger.
- ❖ Vascular malformations are heritable as well as genetic conditions with predisposition to tumors such neurofibromatosis and tuberous sclerosis.

The Approach to **History Taking**

- ❖ **What do you think is causing your headache?**
- ❖ While this question doesn't identify a secondary headache, it identifies the level of parental anxiety about the headache and sets the discussion on confident reassurance for the clinical diagnosis of a primary headache disorder.
- ❖ Elicit any fears the patient may have such as, "I think I have a brain tumor" or "I'm being punished, because I'm bad."
- ❖ Some intuitive children know that their headaches are due to self-imposed or externally imposed stress at school or are related to family problems such as abuse.

Historical feature	Possible significance
Headache history	
Age at onset	<ul style="list-style-type: none"> Migraines frequently begin in the first decade of life. Chronic nonprogressive headaches begin in adolescence.
Mode of onset	Abrupt onset of severe headache ("thunderclap headache" or "worst headache of my life") may indicate intracranial hemorrhage.
What is the headache pattern: acute, acute recurrent, chronic progressive, nonprogressive daily, or mixed?	Helps to determine the cause (refer to the UpToDate topic on evaluation of headache in children)
How often does the headache occur?	<ul style="list-style-type: none"> Migraines typically occur 2 to 4 times per month; almost never daily. Chronic nonprogressive headaches may occur 5 to 7 days per week. Cluster headaches typically occur 2 to 3 times per day for several months.
How long does the headache last?	<ul style="list-style-type: none"> Migraines typically last 2 to 3 hours in young children and may last longer (48 to 72 hours) in adolescents. The duration of tension headaches is variable; they may last all day. Cluster headaches usually last 5 to 15 minutes but may last for 60 minutes.
Is there an aura or prodrome?	Aura or prodrome is suggestive of migraine; if the warning symptoms are focal and repeatedly located to the same side of the body, a seizure or vascular or structural cause should be suspected.
When do the headaches occur?	<ul style="list-style-type: none"> Headaches that wake the child from sleep or occur on waking may indicate increased intracranial pressure/space-occupying lesion. Tension-type headaches typically occur late in the day.
What is the headache quality (throbbing/pulsating, dull aching, squeezing, etc)?	<ul style="list-style-type: none"> Migraines have a throbbing/pulsating quality. Chronic nonprogressive headaches have a squeezing pressure or tightness that waxes and wanes. Cluster headaches have a deep continuous pain.
Where is the pain?	<ul style="list-style-type: none"> Occipital location may indicate posterior fossa neoplasms but also may occur in basilar migraine. Cluster headaches are usually temporal or retro-orbital. Localized pain may suggest a specific secondary etiology (eg, sinusitis, otitis, dental abscess).
What brings the headache on or makes it worse?	<ul style="list-style-type: none"> Headache in the recumbent position or with straining/Valsalva may indicate an intracranial process. Migraines may be triggered by certain foods, odors, bright lights, noise, lack of sleep, menses (in females), and strenuous activity. Tension-type headaches may worsen with stress, bright lights, noise, strenuous activity. Cluster headaches may be worsen with lying down or resting.
What makes the headache go away?	<ul style="list-style-type: none"> Migraines typically respond to analgesic medications, dark, quiet room, cool compress, or sleep. Chronic tension-type headaches may respond to sleep (but not to analgesic medications).
Are there associated symptoms?	<ul style="list-style-type: none"> Neurologic deficits (eg, ataxia, altered mental status, binocular horizontal diplopia) may indicate increased intracranial pressure and/or a space-occupying lesion. Fever may indicate infection, or rarely intracranial hemorrhage. Stiff neck may indicate meningitis, complicated pharyngitis, or intracranial hemorrhage. Localized pain may indicate localized infection (eg, otitis media, pharyngitis, sinusitis, dental abscess). Autonomic symptoms (eg, nausea, vomiting, pallor, chills, fever, dizziness, syncope, etc) may indicate migraine or cluster headache. Dizziness, numbness, and/or weakness may occur with idiopathic intracranial hypertension.
Do symptoms continue between headaches?	<ul style="list-style-type: none"> Persistence of symptoms (neurologic symptoms or nausea/vomiting) between headache episodes is suggestive of increased intracranial pressure and/or mass lesions. Resolution of symptoms between episodes is characteristic of migraine headaches.
Headache burden	
Do the headaches impair normal functioning (eg, school attendance, activity) and quality of life?	Children with chronic nonprogressive headaches have frequent school absences; impaired function may warrant referral.
Additional information	
Past medical history	Certain underlying conditions increase the likelihood of intracranial pathology (eg, sickle cell disease, immune deficiency, malignancy or history of malignancy, coagulopathy, cardiac disease with right-to-left intracardiac shunt, head trauma, neurofibromatosis type 1, tuberous sclerosis complex).
Medications and vitamins	Medications that may cause headache include oral contraceptives, glucocorticoids, selective serotonin reuptake inhibitors, and serotonin-norepinephrine reuptake inhibitors, among others. Medications associated with idiopathic intracranial hypertension include growth hormone, tetracyclines, vitamin A (in excessive doses), and withdrawal of glucocorticoids.
Recent change in weight or vision	May be associated with intracranial process (eg, pituitary tumor, craniopharyngioma, idiopathic intracranial hypertension).
Recent changes in sleep, exercise, or diet	May precipitate headaches; may be associated with mood disorder.
Change in school or home environment	May be a source of psychosocial stress.
Family history of headache or neurologic disorder	Migraine and some tumors and vascular malformations are heritable.
What do child and parents think is causing the pain?	Indicates their levels of anxiety about the headache.
Mental health history/symptoms, psychosocial stressors	Chronic nonprogressive headaches may be associated with depression or anxiety.

Physical Examination

- General looking
- Vitals
- Palpation
- Auscultation
- Special tests



General appearance

Altered mental status?

Think of:

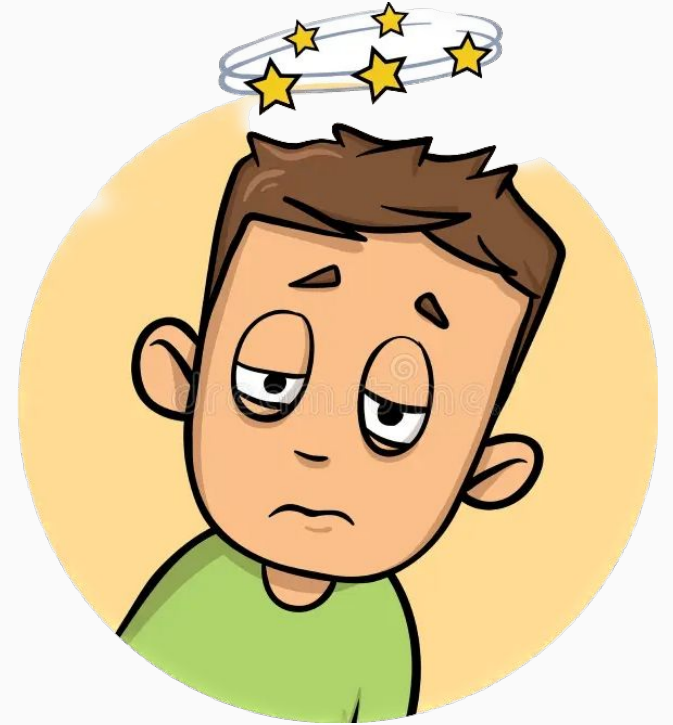
meningitis

encephalitis

intracranial hemorrhage

elevated intracranial pressure

hypertensive encephalopathy.



Head circumference?

Macrocephaly may indicate slowly progressive increases in intracranial pressure.

Vital signs

BP

Hypertension may cause headache or
be a response to increased intracranial pressure

Temperature

Fever suggests infection

(most commonly upper respiratory infection) but may occur with intracranial hemorrhage or central nervous system malignancy

Palpation of the head and neck

Sign

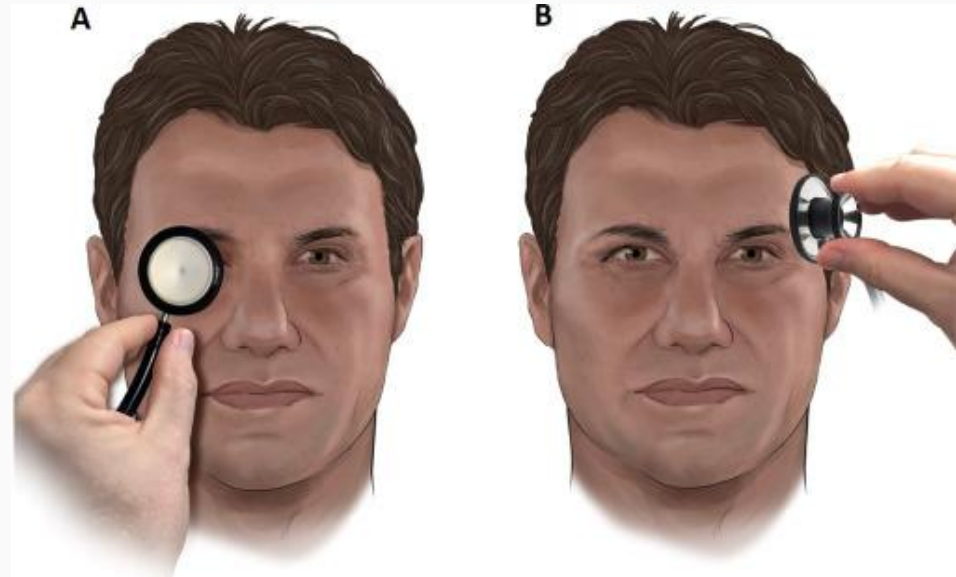
- Localized scalp tenderness
- Scalp swelling
- Sinus tenderness
- Temporomandibular joint (TMJ) and/or masseter tenderness
- Nuchal rigidity
- Posterior neck pain

Think of..

- Migraine and tension-type headaches
- Head trauma
- Sinusitis
- TMJ dysfunction
- meningitis
- anatomic abnormality (eg, Chiari malformation)

Auscultation

Auscultation of the neck, eyes, and head for bruit:
Bruit may indicate arteriovenous malformation.



Special tests

Visual field

Visual field abnormalities may indicate increased intracranial pressure and/or a space-occupying lesion.

Funduscopy

Papilledema may indicate increased intracranial pressure
Funduscopy examination is normal in primary headache

Otoscopy

May demonstrate otitis media; hemotympanum may indicate trauma.

Oropharynx

Signs of pharyngitis? Dental decay or abscess?

Neurologic examination

Abnormal neurologic examination (particularly mental status, eye movements, papilledema, asymmetry, coordination disturbance, abnormal deep tendon reflexes) may indicate intracranial pathology but also may occur with migraine headache.

Skin examination

Signs of neurocutaneous disorders (eg, neurofibromatosis, tuberous sclerosis complex, which are associated with intracranial neoplasms) or trauma (bruises, abrasions, etc).

Spine

Signs of occult spinal dysraphism (eg, midline vascular or pigment changes), which may be associated with structural abnormalities (eg, Chiari malformation).

Neuroimaging

Neuroimaging studies may detect a variety of disorders that cause secondary headache, including congenital malformations, hydrocephalus, intracranial infections and their sequelae, trauma and its sequelae, neoplasms, vascular disorders (such as arteriovenous malformations), and intracranial thrombosis. However, most children who present to primary care have signs and symptoms consistent with primary or uncharacterized headaches and do not require neuroimaging

Indications

Children with an abnormal neurologic examination, children younger than six years, or children who have features worrisome for a pathologic intracranial process generally should undergo neuroimaging with magnetic resonance imaging (MRI).

Neuroimaging also is indicated for severe headache in a child with an underlying disease that predisposes to intracranial pathology (eg, immune deficiency, sickle cell disease, neurofibromatosis, history of neoplasm, coagulopathy, hypertension)

Worrisome findings

It is particularly important to ask about and look for symptoms and signs of increased intracranial pressure, intracranial infection, and progressive neurologic disease. Worrisome findings are an indication for further evaluation and/or neuroimaging

Worrisome findings are classified into:

1. Headache characteristics
2. Patient history
3. Family history (Absence of family history of migraine)
4. Examination findings

Headache characteristics

Headache awakens the child or occurs consistently upon awakening from sleep

Short or paroxysmal headache; thunderclap headache (uncommon in children)

Associated neurologic signs and symptoms (eg, persistent nausea/vomiting, altered mental status, ataxia, etc)

Headache worsened in recumbent position or by cough, micturition, defecation, or physical activity

Absence of aura

Chronic progressive headache pattern

Change in quality, severity, frequency, or pattern of headache

Occipital headache

Recurrent localized headache

Lack of response to medical therapy

Headache duration of less than six months

Patient history

Inadequate history (description of headache and relative features)

Risk factor for intracranial pathology (eg, sickle cell disease, immune deficiency, malignancy or history of malignancy, coagulopathy, cardiac disease with right-to-left intracardiac shunt, head trauma, neurofibromatosis type 1, tuberous sclerosis complex, pre-existing hydrocephalus or shunt)

Age <6 years

Personality change

Deterioration of school work

Associated symptoms in the neck or back

Examination findings

Child uncooperative (unable to complete neurologic examination)

Abnormal neurologic examination (eg, ataxia, weakness, diplopia, abnormal eye movements, other focal signs)

Papilledema or retinal hemorrhages

Growth abnormalities (increased head circumference, short stature or deceleration of linear growth, abnormal pubertal progression, obesity)

Nuchal rigidity

Signs of trauma

Cranial bruits

Skin lesions that suggest a neurocutaneous syndrome (neurofibromatosis, tuberous sclerosis complex)

Timing

The level of urgency is determined by the status of the patient and the speed with which the situation is evolving. Urgent neuroimaging is reserved for patients with signs of increased intracranial pressure and/or focal neurologic examination with concern for a space-occupying lesion (eg, brain tumor or brain abscess) or intracranial hemorrhage.

Which imaging study

Brain MRI is usually preferred. Head computed tomography (CT) is performed if MRI is not available or imaging is needed immediately (eg, suspected acute hemorrhage, rapid diagnosis of space-occupying lesion). MRI with gadolinium or CT with contrast should be performed if the clinician suspects an inflammatory cause or breakdown of the blood-brain barrier (eg, abscess or tumor).

MRI is usually preferred in non-acute situations (or if there is persistent concern despite a normal head CT scan) because it minimizes radiation exposure and is more sensitive than CT. However, in young children, MRI may require sedation, which CT usually does not.

MR angiography or CT angiography may be indicated if subarachnoid blood or parenchymal blood is identified on initial MRI, CT, or lumbar puncture

Lumbar puncture

Lumbar puncture (LP) generally should be performed in children in whom intracranial infection, subarachnoid hemorrhage, or idiopathic intracranial hypertension (pseudotumor cerebri) is suspected.

Neuroimaging typically is performed before LP because LP is contraindicated in patients with space-occupying lesions. However, in patients in whom bacterial meningitis is suspected, the risks of delaying the LP and administration of antibiotics while awaiting neuroimaging must be considered.

Other tests

Other tests should be performed as indicated to evaluate suspected underlying medical conditions. These tests should be tailored to evaluate conditions suggested by information from the history and examination. Examples include:

- Complete blood count with differential and erythrocyte sedimentation rate (if infection, anemia, vasculitis, or malignancy is suspected)
- Serum or urine toxicology screens (if acute or chronic intoxication is suspected)
- Thyroid function tests (if thyroid dysfunction is suspected)

Electroencephalography

Electroencephalography is not recommended in the routine evaluation of a child with recurrent headaches and typically has no role to play. It is unlikely to be useful in determining the cause of headache or in distinguishing migraine from other types of headache.

Management Considerations



- ❖ The management of recurrent and chronic headache in children and adolescents depends upon the underlying etiology, some management components include :
- ❖ Providing realistic expectations (ie, the frequency and severity of the headaches may decrease over weeks to months of therapy, but the headaches may continue to occur)
- ❖ Return to school for children who have been absent; if necessary, they can go to the school nurse or office once daily for 15 minutes when headache pain peaks

Management Considerations

- ❖ Avoidance of headache triggers (eg, dietary triggers, caffeine, lack of sleep, inadequate hydration, overuse of electronic devices)
- Addressing comorbid sleep problems (eg, delayed sleep onset, frequent night waking), mood problems, and/or anxiety
- Sleep, darkness, and a quiet room are essential in managing acute migraine and tension-type headache. In addition, encourage scheduled times for meals, bedtime, relaxation, and exercise. Individual treatment decisions should be based on the age of the child and receptiveness to behavioral techniques.
- Self-treatment can lead to medication-overuse headache. Therapy must be monitored by parents.

Management Considerations

- ❖ The use of acute medications is a key component of treatment and should include early recognition and addressing barriers to treatment, use of multimodal care when primary acute medication is incompletely effective and avoidance of medication overuse. Preventive medications may be necessary for children with headaches that occur more than four times per month or headaches that adversely affect the child's activities. In deciding to begin prophylactic therapy, consider the risks of long-term drug use against the benefit of potential headache relief.
- ❖ The short-term goals of therapy for migraine and tension-type headache are to relieve pain, alleviate nausea, and promote sleep. The long-term goals are to improve the patient's quality of life by reducing the frequency and severity of headache episodes. The treatment of chronic daily headache (CDH) combines therapies that are used for tension-type and migraine headache.
- ❖ Treatment of a secondary headache is focused on its specific cause, but an additional, symptomatic therapy may be useful as long as the cause has not yet been eradicated.

Management Considerations

- ❖ Drugs used in symptomatic treatment should be chosen carefully according to headache type
- ❖ beta-blockers or cyproheptadine for migraine, amitriptyline for migraine or tension-type headache)
- ❖ frequency (eg, amitriptyline for more frequent/chronic headache)
- ❖ type of symptoms (cyproheptadine if prominent vomiting)
- ❖ adverse-effect profile (eg, no beta-blockers if asthma)
- ❖ It is advisable to include comorbidities in the choice, such as depression and insomnia, which a tricyclic antidepressant helps to control along with migraine.