



Assessing childhood headaches in family medicine

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الملخص

الصداع في الطفولة شائع ، وسيواجه أطباء الرعاية الأولية كشكوى وحيدة أو كجزء من عدة أعراض عند علاج مرضاهم الصغار. معظم حالات صداع الأطفال سببها الصداع النصفي أو العدوى الفيروسية. ولكن توجد حالات أخرى تسبب صداعاً في الأطفال وعلى الطبيب لمعرفة ما يمكن وما لا يمكن علاجه بأمان في الرعاية الأولية أن يسأل عن التاريخ الطبي للمريض

وفحص المريض من العوامل المهمة للوصول إلى تشخيص لمعظم حالات الصداع ولا يتطلب تحقيقات عادة. ولكن لن يستطع بعض أصغر الأطفال شرح أعراضهم. فيجب أن يفهم الطبيب العلامات المشتركة لأنواع الصداع المختلفة ربما يستطيع تفسير سلوك الطفل أو تفسير التاريخ المأخوذ من الوالدين للوصول إلى التشخيص

الكلمات المفتاحية: صداع الطفولة؛ صداع نصفي؛ صداع التوتر. الصداع العنقودي وأورام المخ.



Abstract

Headaches in childhood are common, and primary care clinicians will encounter them either as the sole complaint or part of several symptoms when managing their young patients. Most childhood headaches are due to a migraine or a viral infection. However, there are other conditions that can cause a headache in children and the clinician needs to be able recognise what can and what cannot be managed safely in primary care. Taking a history and examining the patient are the key factors in reaching a diagnosis for most headaches, and investigations are not routinely required. However, in children, especially the very young, may not be able to articulate their symptoms, and so understanding the common features of the different types of headaches will help the clinician to interpret the child's behaviour, or the history taken from a parent, in order to reach a diagnosis.

Keywords: Childhood headache; migraine; tension type headaches; cluster headaches, brain tumours.

1. Introduction

According to the WHO, only 4 hours of undergraduate medical education are dedicated to teaching on headache disorders (“Headache disorders, WHO”, 2016). Furthermore, many people with headache disorders are not diagnosed and treated appropriately: worldwide only 40% of those with migraine or tension type headache are professionally diagnosed. The WHO believes that the principal clinical barrier to the effective care of people who suffer from headaches is lack of learning among health -care providers. Given the prevalence of headache in childhood, it is important that family medicine doctors are familiar with the features of the different types of headaches and how to achieve a diagnosis in primary care, as well as those symptoms which suggest sinister secondary causes are present.

2. Epidemiology

Headache disorders are considered the second most common cause of years of life spent with disability worldwide (Nieswand et al, 2020). The intensity of headaches can vary from a minor bother to a pain that is unbearable (Bener, 2006). In one study, headaches comprised four percent (4%) of general practitioner consultations and 20% - 30% of referrals to a neurologist (Kristoffersen et al, 2013). It is a common complaint in children, with prevalence rates from 5.9% to 37.7% and increase in school-age (40-50%) and adolescent children (80%) (Eeg-Olofsson, 2003). Before the age of 12, a similar proportion of boys and girls suffer from headaches, but thereafter, more females are affected (Abu-Arafeh,2010). The prevalence of certain types of headaches is greater if there is a family history of headaches in first- or second-degree relatives (Aromaa,1999).

The International Classification of Headache Disorders, 3rd edition (ICHD-3), uses 3 broad categories: primary headaches, secondary headaches, and neuropathies and facial pains (Headache Classification, 2018). Primary headaches have no underlying organic disorder and include migraines and tension type headaches. Secondary headaches are symptoms of another disorder recognized as a potential underlying cause, such as a viral illness or idiopathic intracranial hypertension (Whitehouse & Agrawal 2016).



The symptoms of secondary headache symptoms either resolve or reduce following treatment of the causative disorder. Primary headaches and secondary headaches can co-exist.

Although migraines are the most common cause of headaches in children (Ahad & Kossoff, 2008), secondary causes of headache need to be considered in all children presenting with a headache because of the possibility of serious underlying disorders (Özge, A et al, 2017). Intracranial disorders, such as brain tumors, are of significant concern to physicians, patients, and their families. A headache is the most commonly occurring symptom in children with brain tumours, (Wilne et al, 2007).

3. Primary headaches

Migraine is a common cause of headaches leading to consultation with doctors. It has a prevalence of 8% to 23% in older children and 1% to 3% in children age 3 to 7 years (Blume, 2012). Causation is multifactorial, including environmental factors, mitochondrial dysfunction and gene mutations, such as a calcium channel gene - CACNA1A (Pietrobon, 2009). Several migraine triggers have been proposed, such as fatigue, exercise, excess caffeine, and chocolate (Neut et al, 2012).

Migraine attacks in children may last as little as 2 hours. The location of the headache is usually frontotemporal and is more often bilateral. For those who suffer migraine with aura, over 90% of patients experience visual aura [8], typically consisting of a partial loss of vision or blind spot in an otherwise normal visual field (scotomata), zig-zag lines, or scintillations. From a few hours to a few days prior to the migraine, prodromal symptoms such as fatigue, neck stiffness, photophobia and phonophobia can occur. When these symptoms occur up to 48 hours after the headache has ended, they are termed post-dromal symptoms.

Tension-type headache has a lifetime prevalence in the general population ranging between 30% and 78% (Headache Classification, 2018). It shares some provoking agents in common with migraine, such as stress and sleep deprivation.

However, the intensity of pain is typically mild to moderate. The diagnosis of a primary headache can be made more difficult by the phenomenon of transformation of headache type (Virtanen, 2012). 8–32% migraine can transform into TTH in 8–32%, and from TTH to migraine in 4–41% (Torriero, 2016).

Cluster headaches are a type of trigeminal autonomic cephalalgias. The age of onset is usually in the second and third decade of life but can start in the first decade (Majumdar, 2009). There is a higher prevalence in older male children. Genetic epidemiological surveys suggest that first-degree relatives are 5 to 18 times—and second-degree relatives, 1 to 3 times—more likely to have cluster headache than the general population (Bjørn Russell, 2004).

Other less common types of primary headaches can occur in childhood, such as hemiplegic migraine (Meaney, 1996) and abdominal migraine (Carson, 2011).

Hemiplegic migraine possesses the same diagnostic criteria as those for migraine with aura, plus the aura consists of both of the following:

- fully reversible motor weakness
- fully reversible visual, sensory and/or speech/ language symptoms.

The motor symptoms generally last less than three days but weakness may persist for weeks. These headaches can occur in families due to a common genetic mutation, for instance there is a mutation in the CACNA1A gene (coding for a calcium channel) on chromosome 19 that is present in patients with type 1 familial hemiplegic migraine (Headache Classification, 2018).

Abdominal migraine is an idiopathic disorder causing recurrent attacks of moderate to severe midline abdominal pain, lasting 2–72 hours, associated with vasomotor symptoms such as flushing, nausea and vomiting, and with normality between episodes. Headache is absent during these episodes, however, children with abdominal migraine will develop migraine headache later in life.

The table below is adapted from NICE guideline on headaches (NICE CG150, 2015):

Headache feature	Tension-type headache	Migraine (with or without aura)	Cluster headache
Pain location	Bilateral	Unilateral or bilateral. In children it is often bilateral.	Unilateral (orbital, peri-orbital or side of the face)
Pain quality	Pressing/tightening (non-pulsating)	Throbbing or banging in children	Variable (can be sharp, boring, burning, throbbing or tightening)
Pain intensity	Mild or moderate	Moderate or severe	Severe or very severe
Effect on activities	Not aggravated by routine activities of daily living	Aggravated by routine activities of daily living	Restlessness or agitation
Other symptoms	None	Unusual sensitivity to light and/or sound or nausea and/or vomiting Aura- most commonly visual symptoms such as flickering lights. Less frequently, sensory	On the same side as the headache: <ul style="list-style-type: none"> • conjunctival injection and/or lacrimation • nasal congestion and/or rhinorrhea

		<p>symptoms like pins and needles.</p> <p>Speech disturbance may also occur.</p> <p>Symptoms can occur with or without headache and:</p> <ul style="list-style-type: none"> • are fully reversible • develop over at least 5 minutes • last 5–60 minutes <p>Typical aura symptoms include visual symptoms such as flickering lights, spots or lines and/or partial loss of vision; sensory symptoms such as numbness and/or pins and needles; and/or speech disturbance</p>	<ul style="list-style-type: none"> • eyelid oedema • forehead and facial sweating • miosis and/or ptosis
Duration of headache	30 minutes—continuous	2–72 hours	15–180 minutes

4. Secondary headaches

There are a variety of causes underlying secondary headaches.

- Infections:
 - o Typically, these are self-limiting upper respiratory tract infections (Lewis, 2002).
 - o Headache can be a feature of COVID 19 infection (Kremer, 2020).
- Vascular disorders:
 - o In a pediatric population, intracranial hemorrhage (ICH) and arterial ischemic stroke have a prevalence of 74% and 21% respectively [20].

A positive family history of stroke or dementia may suggest the syndrome of cerebral autosomal dominant arteriopathy with subcortical infarcts and leukoencephalopathy (CADASIL) (Özge, A et al, 2017).
 - o Head or neck infection and prothrombotic states can increase the risk of sinus venous thrombosis (SVT) which is an uncommon cause of secondary headaches in children.
- Head injury:
 - o Headaches after a head injury are more commonly occur without significant structural injury.
 - o These post traumatic headaches typically develop within 1 week of the injury and usually resolve within 2 weeks.
- Idiopathic intracranial hypertension:

- o Also termed pseudotumor cerebri, more common in adolescent females. It is associated with obesity and causes a daily headache
- Intracranial hypotension:
 - o This condition can arise if there is a CSF leak, either spontaneously or due to conditions like spinal surgery or trauma to the back.
- Brain tumors:
 - o Rare in children, with an incidence of 5 per 100,000 (Özge, A et al, 2017). Furthermore, for every child presenting with headache as the only feature, there are at least 50 000 children with recurrent headache, including up to 20 000 with migraine (Abu-Arafeh, 2005).
- Overuse of nonspecific analgesics:
 - o Can lead to a headache to occur, especially if analgesics are used more than 3 days a week (Whitehouse & Agrawal 2016).
- One study of children with a chronic daily headache caused by medication
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- overuse showed that in more than half of cases the problem was due to non-steroidal anti-inflammatory drugs (NSAIDs), and in approximately a quarter due to acetaminophen (Özge, A et al, 2017).



Types of secondary headache	Characteristic symptoms and signs
Infection	<p>Typically, a self-limiting acute viral illness will cause a non-specific headache and is usually associated with pyrexia and coryzal symptoms (Blume & Szperka, 2010).</p> <p>In meningitis or encephalitis, headaches are typically associated with photophobia, nausea, and vomiting (Bonthius & Karacay, 2002). However, these features maybe less prominent in infants due to their open skull sutures (Jan, 2012).</p>
Vascular disorder	<p>Suspicious features include first or worst ever headache especially if sudden in onset (the classic thunderclap headache in ICH); onset before the age of 10 years; headache after exertion; accompanied by vomiting; presence of focal signs and papilledema.</p> <p>Children with SVT most commonly present with headache which is gradual onset made worse by bending over or squatting, or while straining with bowel movements.</p>
Trauma	<p>Post-concussive symptoms, such as difficulty sleeping, mood changes and problems with balance can occur. Irritability and sleep disturbances last longest (16 days).</p> <p>One month after concussion, headache can persist in approximately 25% of children (Özge, A et al, 2017).</p>

<p>Intracranial hypertension</p>	<p>The headache is typically worse when lying down.</p> <p>Cranial nerve dysfunction can cause transient loss of vision, tinnitus, and diplopia.</p> <p>In young children, headache, stiff neck, strabismus, irritability, apathy, somnolence, dizziness, and ataxia are commonly present (Blume, 2012).</p>
<p>Intracranial hypotension</p>	<p>Headaches which are worse when the patient is in the upright position and relieved on lying down should suggest the possibility of intracranial hypotension.</p> <p>In approximately 50%, posterior neck pain or stiffness, nausea, and vomiting may also be present.</p> <p>Children can have neck stiffness, as well as horizontal diplopia, vestibulocochlear nerve abnormalities, facial weakness, cerebellar ataxia, and encephalopathy (Özge, A et al, 2017).</p>
<p>Structural Disorders</p>	<p>Headache is the most common presentation symptom of Chiari 1 malformation (Aitken, 2009).</p> <p>The classical presentation includes occipital pain precipitated by cough or Valsalva (Milhorat, 1999).</p> <p>With respect to brain tumours, the most common signs include papilledema, abnormal eye movements, ataxia, abnormal reflexes, and visual field or acuity defects (Whitehouse & Agrawal, 2016).</p>

<p>Medication overuse headache (MOH)</p>	<p>Chronic daily headache without specific headache characteristics or associated symptoms.</p> <p>ICD 3 features of MOH are:</p> <p>A. Headache occurring on ≥ 15 days/month in a patient with a pre-existing headache disorder</p> <p>B. Regular overuse for > 3 months of one or more drugs that can be taken for acute and/or symptomatic treatment of headache</p> <p>C. Not better accounted for by another ICH3 diagnosis (Headache Classification, 2018).</p>
<p>Psychological and Psychiatric conditions</p>	<p>Conditions such as anxiety and depression can present as headaches in children (Lee et al, 2015).</p> <p>Children with a chronic primary headache may develop a depressive illness (Yildirim, 2016).</p> <p>Personality change can be due to the effects of an intracranial pathology (Lanphear, 2014).</p>

5. Approach to diagnosing a headache

A history and thorough examination are required for all children presenting with a headache. Of these, the history is the most important factor in evaluating a headache, although it can be challenging to obtain a history particularly from younger children.

It is important, therefore, to consider non-verbal behaviors, such as preferring to be in a dark room or a quiet environment, intensity of crying, avoiding daily activities, like playing, or food refusal and irritability.

Family members and carers can be involved to help the doctor get a comprehensive picture of the child's symptoms, and a headache diary can help the child and the doctor to identify clues to the diagnosis such as potential triggers and patterns of onset.

The possibility of medication overuse headache needs to be considered if the child is taking regular analgesia. Furthermore, mental health problems, such as depression, can present as headaches (Ling, 1970) and the doctor should not ignore the possibility of somatic manifestations of psychiatric conditions (Lee et al, 2015).

Pattern	<p>Single acute headache: Causes include viral infections and the initial episode of migraine.</p> <p>Sudden onset headache may indicate a secondary headache such as intracranial hemorrhage.</p> <p>Acute recurrent and chronic nonprogressive headaches: Most likely related to a primary headache disorder, although secondary causes of headaches may be present.</p> <p>Chronic progressive headaches: Underlying causes include a brain Tumor or pseudotumor cerebri.</p> <p>Constant steady headache: May be due to a chronic type of</p>
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	primary headache or similar secondary types.
Context	<p>Onset with activity: This can suggest intracranial hemorrhage.</p> <p>Associated trauma:</p> <ul style="list-style-type: none"> • Intracranial hemorrhage or arterial dissection • Intracranial hypotension <p>Emotional stress is a strong trigger of migraine and chronic, daily headache in children. Inquire from the child and their parent or carer about specific learning problems, bullying at school and stress in the family (NICE, 2019).</p>
Localization:	<p>Tension headaches tends to be bilateral.</p> <p>Cluster headaches can be orbital, peri orbital or temporal.</p> <p>Subarachnoid hemorrhage tends to be occipital.</p>
Prior headaches	<p>This is suggestive of a primary headache, but intracranial hypertension or hypotension can also</p> <p>present especially if the headache is associated with certain postures</p>
Headaches of increasing frequency	This can suggest a worsening intracranial pathology.

Provocation	<p>Onset with lying down: This can suggest intracranial hypertension.</p> <p>Onset with upright posture: This can suggest intracranial hypotension.</p> <p>Onset following a Valsalva maneuver like straining: This is suggestive of intracranial hypertension</p>
Other neurological features suggestive of a secondary etiology of headache.	<p>Vision changes such as double vision or loss of vision can be caused by intracranial hypertension or strokes</p> <p>A perceived change in mood or behaviour can be due to an intracranial lesion, although other conditions such as depression need to be considered as well.</p>

6. Physical Examination:

Vital signs	<p>Drowsiness can suggest a secondary cause such as encephalopathy.</p> <p>Raised intracranial pressure or hypertensive encephalopathy can cause hypertension.</p> <p>Cushing's triad of hypertension, bradycardia, and irregular breathing pattern is suggestive of elevated intracranial pressure</p> <p>Pyrexia suggests an infection</p>
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Skin	Neurocutaneous lesions like tuberous sclerosis or neurofibromatosis are associated with intracranial lesions
Head and Neck	<p>Cranial and neck bruit: Vascular malformation or dissection are associated with bruits</p> <p>Sinuses: Tenderness, inflamed mucosa, and purulent discharge may suggest infection</p> <p>Temporomandibular joint (TMJ): Tenderness to palpation can suggest TMJ inflammation causing head pain</p> <p>Oral/dental examination: Features of intra oral disease like dental caries can cause head pain.</p> <p>Meningeal signs: Neck stiffness, photophobia can suggest meningeal inflammation due to inflammatory, infectious, or neoplastic disease.</p> <p>Head circumference (in all children): Abnormal rate of increase suggests an intracranial lesion.</p>
Neurological	<p>Papilledema and reduced visual fields: consider increased intracranial pressure.</p> <p>A miotic pupil in a dark room suggests carotid artery dissection causing Horner's syndrome.</p> <p>Lateralizing nystagmus and limited horizontal or vertical gaze: consider can a brainstem lesion.</p> <p>Horizontal diplopia: consider elevated intracranial pressure or brainstem lesion.</p> <p>Past pointing and abnormal gait: consider a posterior fossa lesion.</p> <p>Upgoing toes (Babinski sign): consider an upper motor neurone</p>

	lesion in the brain or spinal cord.
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7. Reasons for referral

Most children with headache do not require referral to secondary care. Indications for urgent neuroimaging is suggested (BMJ Best Practice, 2019):

- A very severe headache with acute onset
- New focal neurological signs
- Meningism
- Optic nerve oedema
- History suggestive of elevated intracranial pressure
- Possible ventriculoperitoneal shunt infection or malfunction.
- Headache with known or possibly metastatic cancer.
- Headache in an immunocompromised patient.

It is important to remember that the concept of red flag symptoms or signs as indicators of secondary headache, and therefore of the need for imaging, is well established in adult neurology but is not directly applicable to children (White, 2011). Hence, the NICE guideline [NG127, 2019] provides suggestions for red flags in those patients aged under 12 years:

<p>Refer immediately children aged under 12 years for a same day assessment, according to local pathways, if they have a headache these features</p>	<ul style="list-style-type: none"> • Wakes them at night. • Present on awakening in the morning. • Progressively worsens. • Triggered or aggravated by coughing, sneezing or bending down. • Associated with fever and features of meningism. • Associated with vomiting. • Associated with ataxia. • Associated with change in conscious level or pervasive lethargy. • Associated with squint or failure of upward gaze ('sunsetting'). • Occurring within 5 days of a head injury
<p>Refer urgently all children aged under 4 years with headache for neurological assessment</p>	<p>Recurrent headaches and migraines</p>



8. Conclusion

Several types of headaches occur in childhood. Viral illness, migraines and tension type headaches are the most common types that occur in this age group. The International Classification of Headache Disease provides helpful criteria that characterize these headaches, and the family medicine doctor will need to undertake a thorough history and clinical examination to diagnose those headaches.

A headache diary and inspecting the behaviour of young children can help to identify headaches such as migraine. In certain types of migraine and in secondary causes, like ischemic stroke, there can be a family history. Whilst most headaches will not have underlying intracranial pathology, clinical features that may indicate the presence of such need to be recognized and the patient appropriately referred for further investigation and definitive management.

Clinical features that may indicate intracranial pathology in children include an abrupt onset of headache, worsened by lying down or straining, the headache that is progressing over time, occipital location, personality change, abnormal increase in head circumference and neurological findings such as papilledema and ataxia

Family medicine doctors also need to consider the possibility of a psychological or psychiatric condition in children presenting with a headache, either as a cause or a result of the headache. Family members and carers can be helpful in providing more information, particularly if the patient is a young child.

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