Headache

Headache can be divided into primary headache and secondary headache. In primary headache the headache syndrome, i.e. the head pain and any associated features, are the disease process. In secondary headache the headache syndrome is a symptom of an underlying disorder. The secondary headache may have the same clinical features as a primary headache disorder.

The fundamental question is how do you differentiate primary from secondary headache? Non-traumatic headache comprises between 1.2 and 4.5% of emergency department presentations. The majority of patients have a benign headache disorder, most commonly migraine. The majority of alert patients who present with headache will have normal medical and neurological examinations. Current day access to imaging allows the detection of secondary structural pathology, but the yield of imaging in these patients is minimal. The diagnosis in the majority of patients is not based upon the imaging but is clinical. Inappropriate imaging is complicated by the more difficult interpretation as to whether any visualized abnormality and the headache are related. An adequate history is therefore crucial.

Differentiating secondary from primary headache

The core aspects of the history which aid differentiation between primary and secondary headache are mode of onset, temporal course, additional neurological and/or systemic features. Patients with abnormal neurological and/or systemic features are more likely to have secondary headache. Patients with acute or subacute onset headache with a temporal evolution of persistent or progressive pain should be investigated for secondary headache. These patients usually develop additional neurological and or systemic symptoms and/or features in secondary headache.

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Patients with episodic and recurrent headache or those with episodic headache evolving to chronic headache are likely to have a primary headache disorder. Outside the context of typical migraine aura, neurological and systemic features are absent in the latter group of patients. This basic concept can be used to differentiate primary from secondary headache. Investigation can be tailored to the history and examination findings (*Tables 1* and *2*).

Secondary headache

Acute onset severe headache

Typically this is the patient who presents with 'thunderclap' headache. Thunderclap headache is a severe head-

Table 1. Acute onset thunderclap headache

Differential diagnosis	Investigation*	Pertinent features
Aneurysmal and non-aneurysmal subarachnoid haemorrhage	CT/CSF	Neck stiffness. Mild fever. Focal neurology (if blood has tracked into the brain). Seizures. Raised intracranial pressure (obstruction of CSF outflow by blood)
Intracerebral haemorrhage	CT	Focal neurology. History of hypertension. Predisposition to bleeding, e.g. anticoagulants
Subdural/ epidural haematoma	CT	Altered level of consciousness. Focal neurology. Raised intracranial pressure (mass effect). Head injury or predisposition – elderly, patients with epilepsy, alcohol dependence
Acute ischaemic stroke	CT	Sudden onset focal neurological deficit. Cerebrovascular risks, e.g. hypertension, diabetes, ischaemic heart disease
Internal carotid and vertebral artery dissection	CT/MRI	Anterior neck pain + ipsilateral Horner's syndrome (carotid) or posterior neck/occipital pain. Sudden onset focal neurological deficit (from thromboembolic event consequent upon dissection). History of hypertension/trauma
Cerebral venous thrombosis	CT + contrast/ MRI/MRV	Focal neurology. Prothrombotic predisposition, sepsis, dehydration
Pituitary apoplexy (haemorrhage/infarction of pituitary macroadenoma/non-adenomatous pituitary tissue)	CT/MRI	Visual disturbance (bitemporal hemianopia), oculomotor paresis (III, IV and VI involvement in cavernous sinus), alteration of consciousness. Endocrinopathies
Colloid cyst III ventricle	CT	Raised intracranial pressure. Alteration of consciousness
Acute expansion posterior fossa mass lesion	CT	Focal neurology. Raised intracranial pressure
Spontaneous intracranial hypotension	MRI+contrast (dural enhancement)	Headache better supine and worse upright
Benign sexual headache/exertional/ cough headache	CT/CSF	One or more precipitants. Recurrent. No abnormal systemic or neurological features. Diagnosis of exclusion
Benign thunderclap headache	CT/CSF	One or more precipitants. May be recurrent. No abnormal systemic or neurological features. Diagnosis of exclusion

*The diagnosis can be made in all cases on CT with or without contrast and if normal CSF examination. MRI may be required if the diagnosis cannot be confirmed with CT for venous sinus thrombosis or late (>2 weeks) SAH. Magnetic resonance imaging is the investigation of choice for arterial dissection, pituitary apoplexy and intracranial hypotension as indicated. CT = computed tomography; MRI = magnetic resonance imaging; MRV = magnetic resonance venography; SAH = subarachnoid haemorrhage

ache of rapid onset from a pain-free to a severe headache state within seconds up to a minute. There are a number of aetiologies (*Table 1*). However, benign causes of thunderclap headache cannot be differentiated from secondary thunderclap headache, thus all patients with thunderclap headache should be investigated. The most notable presentation of secondary thunderclap headache is subarachnoid haemorrhage. Computed tomography (CT) within 24 hours will detect subarachnoid blood in 95% of cases; at day three 74%; after 1 week, 50%; after 2 weeks, 30%; and after 3 weeks, almost nil.

Xanthochromia starts to develop in the CSF at 4 hours and is present in 100% of cases at 12 hours. Therefore examination before this time may yield a false negative result. Red cell count in subsequent collections and visual inspection for xanthochromia are not reliable. The probability of detecting xanthochromia with spectrophotometry in the CSF after a subarachnoid haemorrhage is 100% after 12 hours, 100% after 1 week, 100% after 2 weeks, more than 70% after 3 weeks, and about 40% after 4 weeks. Presentation after this time should be managed with magnetic resonance imaging (MRI) and angiography (MRA) or catheter angiography as dictated by the degree of clinical suspicion.

In the acute stage the blood may be isointense with the brain on MRI, therefore CT is the imaging modality of choice. In the subacute stage (at least 1 week) MRI may show signal hyperintensity in the region of the haemorrhage on T1 weighted images; haemoglobin is converted to methaemoglobin which provides the signal change. All patients with proven subarachnoid haemorrhage will need further imaging with MRA or usually catheter angiography, to elucidate the aetiology, whether aneurysmal or non-aneurysmal (e.g. cerebral and dural arteriovenous malformations or transmural arterial dissection).

The diagnosis of most cases of secondary thunderclap headache can be made on CT with or without CSF examination. In a few instances MRI may be required instead of CT, e.g. carotid or vertebral dissection (MRI), pituitary apoplexy, spontaneous intracranial hypotension (MRI with gadolinium to look for dural enhancement), and if indicated by the history and the CT is not diagnostic, e.g. cerebral venous sinus thrombosis (MRI and magnetic resonance venography (MRV)).

Table 2. Subacute onset headache

Differential diagnosis	Pertinent features	Diagnosis confirmed by
Meningitis	Fever. Neck stiffness. Altered level of consciousness. Seizures. Focal neurology. Raised intracranial pressure	CT+ CSF
Subdural haematoma	Fluctuating levels of consciousness. Focal neurology. Raised intracranial pressure (mass effect) Headache injury or predisposition (elderly, patients with epilepsy, alcohol dependence)	CT
Intracranial tumour	Seizures. Focal neurology. Known primary elsewhere	CT and/or MRI
Intracranial abscess	Seizures. Focal neurology. Direct spread from local disease (sinusitis), or metastatic spread (cutaneous, lung abscess)	CT and/or MRI
Venous sinus thrombosis	Seizures. Focal neurology. Raised intracranial pressure	CT + contrast/MRI/MRV
Idiopathic intracranial hypertension	Visual obscurations – transient visual loss on bending forward. Visual failure. Diplopia (VI nerve palsy-false localizing sign), intracranial noises/tinnitus. Females, 15–44 years age, associated with weight gain/obesity	Normal CT + contrast/MRI/MRV (exclude venous sinus thrombosis) – may see an 'empty sella' sign / CSF examination (pressure >25 cmH_2O and normal constituents)
Giant cell arteritis	Low-grade fever, pain and stiffness shoulder and pelvic limb girdle, malaise, asthenia, weight loss, visual impairment, jaw claudication. Rapid steroid response (40–60 mg) within a few days	Raised ESR (10% may be normal), superficial temporal artery biopsy before or within 1 week of starting steroids (minimizes false negative results) – patchy granulomatous arteritis, therefore biopsy may be may be normal
Sinusitis	Associated upper respiratory tract infection. Local pain, nasal congestion, purulent drainage	Clinical diagnosis

CT = computed tomography; ESR = erythrocyte sedimentation rate; MRI = magnetic resonance imaging; MRV = magnetic resonance venography.

Subacute onset headache

Secondary subacute onset headache develops gradually but remains persistent and may be progressive. There are usually additional neurological and/or systemic features (*Table 2*). Any indication of systemic infection should prompt CT and CSF examination if there is no space-occupying lesion. In a patient with a high indication of suspicion of meningitis, a lumbar puncture can be performed before imaging if there are no focal neurological signs and no evidence of intracranial hypertension. CSF pressure should always be measured. Antibacterial therapy will not alter the CSF finding for several hours so should be started empirically.

There should be a low threshold for investigation of patients with new onset persistent and/or progressive headache, particularly those without a past history of headache, and the older patient group (>50 years old); an example of such a case is temporal arteritis (TA). Patients with TA have headache and are systemically unwell. The erythrocyte sedimentation rate (ESR) may be normal but even in this situation a high index of suspicion should be prompted by the history and not the ESR. Other indicators include anaemia of chronic disease, leucocytosis, thrombocytosis, abnormal liver function tests and raised C-reactive protein level (raised acute phase proteins). The converse is true for a patient >50 years of age who presents with persistent or progressive headache with an elevated ESR but no other supportive features of TA.

Long-term use of steroids in these patients needs to be considered cautiously. The headache in patients with TA has a dramatic response to steroids (prednisolone 40–60 mg) within a few days. This should be started before temporal artery biopsy which may still be abnormal 1 week after initiating steroid therapy. Since the arteritis may be patchy the biopsy may be normal in an affected individual. If there is not a dramatic response and the history of headache is not supported by additional systemic features, the diagnosis should be reconsidered unless a TA biopsy proves otherwise.

Primary headache

Recurrent and episodic headache (frequent)/chronic daily headache

Most patients with recurrent, episodic headache and chronic daily headache evolving from episodic are likely to have a primary headache syndrome. A secondary headache should be considered if there has been a change in character of the headache disorder, particularly if there are additional warning indicators of systemic and/or neurological features. Outside this context patients with frequent recurrent episodic headache and chronic daily headache have marked disability associated with significant economic burden.

The most severely affected sufferers account for most of the work loss and reduced performance. Migraine is the most common disabling primary headache disorder, accounting for most of this group. On the World Health Organisation Global Burden of Disease Disability Scale, severe migraine tops the 1–7 rating scale.

Having established the mode of onset and temporal pattern, an absence of associated systemic or neurological features, the main issues to address in this patient group are disability and appropriate management of the headache disorder. There is a wealth of supportive evidence that in predisposed individuals overuse of acute relief medication can result in the development of more frequent and daily headache. The most frequently implicated acute relief medications are opioid analgesics, ergotamine and paracetamol, alone or in combination often with caffeine. More recently the triptans have also been implicated. Less commonly implicated are the non-steroidal anti-inflammatory drugs.

Unfortunately in the acute setting opioids are the most frequently used. This is driven by the requirement of rapid patient turnover and the most effective immediate therapeutic option, the corollary of which is the frequent re-attender. The most optimal acute treatment is a non-steroidal anti-inflammatory with or without an anti-emetic (parenteral or rectal). Such patients and their GPs should be advised to minimize acute relief medication use and establish effective and tolerated preventative therapy. The latter is rarely achieved in the presence of medication overuse headache.

Conclusions

Patients with secondary and primary headache may present with headache with similar clinical characteristics. Differentiation of secondary headache from primary relies on obtaining an adequate history. Rapid or recent onset headache which persists or progresses should be investigated. Any patients with headache and systemic or neurological features should be investigated. Patients with episodic and recurrent headache, or episodic evolving to daily headache in the absence of systemic or neurological features, are likely to have a primary headache disorder. These patients require adequate management of their headache otherwise they are likely to repeatedly re-attend. The clinical syndrome, e.g. migraine, tension-type headache, will dictate which medical treatments are likely to be efficacious.

In patients with frequent or daily headache a careful drug history needs to be taken to ascertain the possibility of medication overuse headache. In this group minimization or withdrawal of acute relief medication may alone result in improvement of symptoms. If this is not the case any preventative therapy is more likely to be efficacious in the absence of medication overuse. Patients with a past history of a primary headache disorder may present with secondary headache; this may be indicated by a change in character or pattern of symptoms, additional systemic or neurological features. BJHM

Conflict of interest: none.

Further reading

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KEY POINTS

- Acute or subacute onset headache should be investigated – primary (benign) headache in this group of patients is a diagnosis of exclusion.
- Most patients with secondary headache will have additional abnormal neurological and/or systemic symptoms and signs.
- Most recurrent episodic and chronic daily headache is benign.
- Recurrent episodic and chronic daily headache should only be investigated if the nature of the headache changes and/or associated neurological and/or systemic symptoms and signs develop.
- Frequent acute-relief medication use should be considered in episodic headache evolving to more frequent and daily headache.